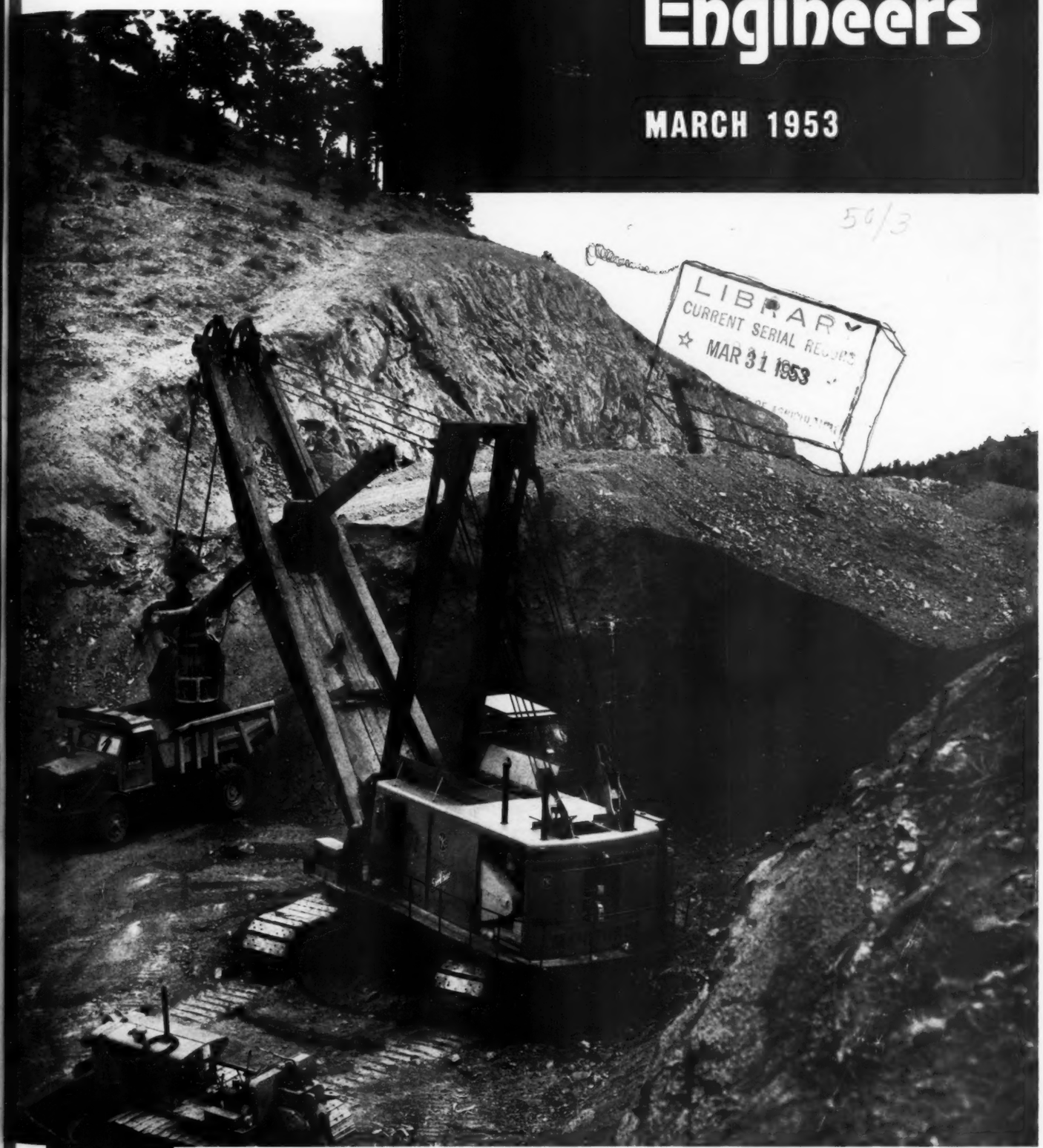
Contractors and Engineers

MARCH 1953



Working in a deep cut on Union Pacific Railroad's big grading job in Wyoming, this Manitowoc 5-yard shovel loads a Euclid end-dump truck.

Story on page 26

Constructing a plant-mixed Texaco Asphalt pavement of the cold-laid type on Indiana State Highway 28 near Alexandria. Old pavement was widened and undersealed with asphalt. Contractor — Brooks Construction Co., Fort Wayne, Ind.

Indiana gives old highway a new

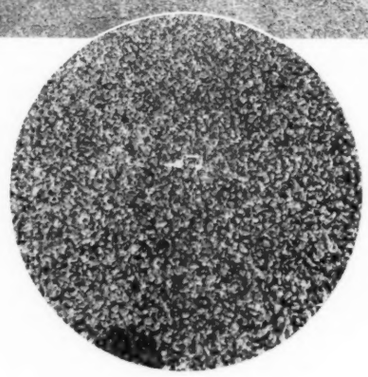
intermediate-type Asphalt surface

Indiana chose one of the intermediate types of asphalt construction when it modernized this section of State Route 28 last year. The new surface is of the plant-mixed, cold-laid type, in which a Texaco Rapid-curing Cutback Asphalt serves as binder for the broken stone aggregate. This surface was put down in two courses, with an interval of five days between courses for curing and setting up. A seal coat of RC Cutback, covered with chips, completed the new pavement.

This is another of the complete range of road and street types which Texaco Asphalt Cements, Cutback Asphalts and Slow-curing Asphaltic Oils offer the road builder. These types vary in durability and in cost. Among them, you will find the answer to your own street, highway or airport improvement problem, with due consideration being given to traffic, available aggregate and budget limitations.

Whether used in a heavy-duty pavement or an inexpensive surface-treatment, Texaco Asphalt products deliver a consistently dependable performance, because they are refined from scientifically selected crudes and are backed by half a century of asphalt refining experience.

Helpful information about the various plant-mixed types of Texaco Asphalt paving, as well as those types in which Texaco products are applied by pressure distributor, is presented in two booklets which our nearest office will send you with no obligation on your part.



(above) Completed section of this intermediate type of Texaco Asphalt paving on Route 28.

(right) Close-up of the new pavement prior to application of the seal coat of Texaco RC Cutback Asphalt.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd Street, New York 17

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TEXACO ASPHALT

EDITORIAL

There Are Still No Short Cuts

If any young engineers believe there are short cuts to advancement in their profession, they would do well to get rid of the idea fast. Not even the opportunist who marries the boss's daughter can be assured of rapid advancement these days. Progress in the engineering profession depends more than ever on hard work, study, and luck . . . with hard work the most important.

From interviews with top men in construction, we are struck by the thought that now, more than ever, it takes 24 hours' work a day 7 days a week to get ahead.

"Young college engineers should understand that they're not worth a dime to the man who hires them until they've rounded out their technical educations with a background of experience", said C. W. Wood, the man who is directing construction of Hungry Horse Dam in Montana. "And that experience takes time—plenty of time on every and all phases of a job. It takes a lot of study and reading to keep abreast of this changing construction picture."

Failure to spend the necessary time on this experience is a far worse threat to the young engineer's career than any other factor. Through experience comes the confidence and ability to take on new responsibilities. Only by accepting increased responsibilities and discharging them in a capable manner can today's young engineer forge ahead.

At the last meeting of the American Association of State Highway Officials, C. W. Hathaway of Illinois pointed out that many of the nonprofessional bottom jobs — a rich starting point for experience—are now being filled not by engineers, but by nonprofessionals.

"They're happier there", said Hathaway. "They don't expect to start at the top. They don't expect supersonic advancement before they're ready. They're not frustrated after 6 months, and we're finding they're giving us better performance than young engineers."

Implicit in Hathaway's remarks was the unspoken plea that young engineers should understand this, and be prepared to spend the same time learning the profession as was customary a decade or two ago. It isn't a bad idea. There is nothing wrong with learning a profession thoroughly through experience.

Practically any top-flight engineer in charge of a project of any size must be a designer, an economist, a construction man, research engineer, materials specialist, and diplomat. His diplomacy must be as good as his engineering. He must master each branch of his profession with equal thoroughness. He must be particularly good at administration; at working with people of diverse temperaments. That is why it takes so many hours a day so many days a week to learn these things.

Actual energetic work on the job must be rounded out with regular reading of current material pertaining to the profession. Occasional visits to other jobs often help to amplify the experience-training process. It is wise to cultivate outside interests. Many branches of engineering overlap. The engineer who specializes too much usually narrows his scope for advancement.

If the many men we talk to are right in their belief that fundamental hard work is lacking, that fact should be a happy circumstance for the serious young man earnestly wishing to get ahead. For simply by heeding the plea, "give your job all your time, son", a young man will soon be able to write his own ticket.

There are no short cuts. No man could be proud of engineering or construction if there were.

The Increasing Burden on the Highways

By 1975 it is estimated that there will be a 75 per cent increase in the number of automobiles on the nation's roads and a 150 per cent increase in the number of trucks. In round figures that means 85,000,000 motor vehicles compared with 53,400,000 at the end of 1952. Of these, 20,000,000 will be trucks, as against 9,500,000 at the end of 1952. Will the roads of 1975 stand up to this colossal burden?

H. A. Radzikowski, Chief of the Maintenance Branch of the Bureau of Public Roads, is concerned about these figures, as he may well be. Not only is it a case of there being more vehicles, but the number of those carrying heavy loads will be greater. As the population becomes more mobile, the highways assume an ever-increasing importance. No longer do farmers resign themselves to being snowed in from time to time during the winter. They depend upon the highway departments to plow them out, and those who have oil burners expect the fuel and service trucks to get through to them. Also, farmers and their families have become used to going back and forth to town and market several days a week and to sending the children to school in special buses. So the highway departments, as Mr. Radzikowski pointed out at a recent meeting of Wisconsin County Commissioners, have a heavy responsibility.

The provision of adequate roads to serve highway transportation is a business just like any other and must be made to pay its way. What is the best way of laying out the increasing millions that have to be spent on the nation's roads? Completion of a long-range reconstruction program is a distant goal. In the meantime we must do everything possible to bring our existing highways up to substantially adequate standards. Efficient maintenance also plays a most important role in the overall highway picture.

Contractors and Engineers

the NEWS magazine of the construction industry

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NEWS AND VIEWS

of the Construction Industry – Highway Financing, Shortages

After watching the vigorous adequate-highways program built up during the past year it is now gratifying to see concrete plans being made that get at the real **heart of the problem—dollars.**

A special report recently turned over to the California Legislature covers the State's complete traffic situation and offers several methods of financing a 15-year construction program. It points out that present financing will meet only one-third of today's deficiencies within 5 years and will fall one billion dollars short in 15 years.

Two methods are therefore proposed to complete the State's full program in 15 years. One recommends continuing the present pay-as-you-go plan by increasing highway-user taxes 22 per cent. This would meet one-half of the present deficiencies within 5 years.

The other method would increase the taxes as in the previous one and also issue $500,000,000 of 20-year revenue bonds at the rate of $100,000,000 a year. Such a plan would meet two-thirds of the present deficiencies within 5 years, and as in method No. 1 would complete the program in 15 years. The report points out that the interest cost of the bonds would be **saved many times over** by reduced maintenance and stopgap work and through early acquisition of rights-of-way.

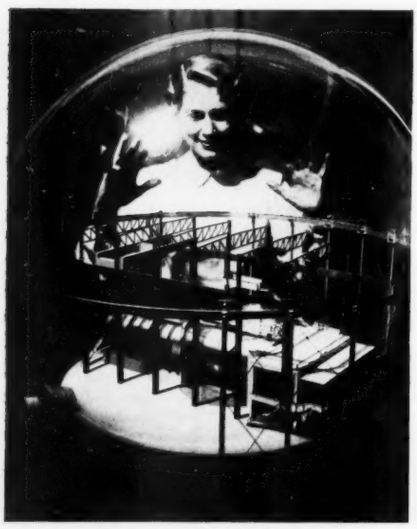
The California Legislature now has a real basis for formulating a practical program of highway development.

In Maryland, the State Roads Commission distributed a 152-page book outlining a **12-year program** for modernizing the State's highways. It recommends a one-cent gasoline-tax boost and increases in motor-vehicle and license fees.

Another partial answer to the problem—**the toll road**—is still gaining favor in many quarters. Inspired by the enthusiastic first-year report of the New Jersey Turnpike Authority, toll-road proposals were advocated or are anticipated this year in at least 22 states.

Financial proposals under the terms of existing laws are being considered in 13 states. Toll-road construction is under way in New Jersey, New York, Ohio, Oklahoma, Pennsylvania, and West Virginia.

The toll road is undoubtedly far from a panacea, but the public's overwhelming willingness to pay large sums for fast safe driving makes it one of the **most encouraging plans** offered thus far.



Ester Sonn, of Knolls Atomic Power Laboratory, does a little crystal gazing with General Electric's plastic model of the huge steel sphere which will house a prototype of an atomic power plant for submarines (See C. & E. Jan., 1953, pg. 66).

Although financing is the biggest problem for highway planners to overcome, several others appear to be gaining in importance. Most of these are in the way of shortages—**both men and materials.** Highway departments are finding it more and more difficult to compete with private enterprise for engineering personnel. And, as F. J. Johnson, Chief Engineer of the Utah State Road Commission, said recently, "It is the poorest form of economy to operate with any except the best personnel and a sufficient number of such personnel to plan and supervise our highway work".

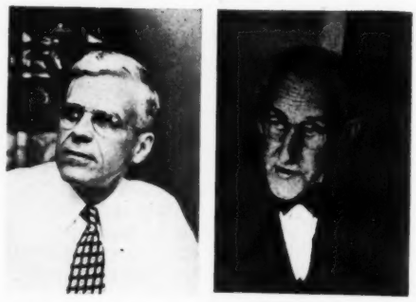
Concerning material shortages, the National Ready Mixed Concrete Association predicts a **serious cement shortage** this year in several parts of the country. Large construction projects in Ohio, Florida, Michigan, New Jersey, New York, and Pennsylvania should make the shortage in these states particularly serious. The basic causes of the shortage are (1) inadequate cement production; (2) strikes; and (3) railroad-car shortage.

The **outlook on steel** is much more encouraging. Ore boats, railroads, trucks, men, the U. S. Coast Guard, and even nature combined last year to prevent the anticipated ore shortage which would have closed down the steel mills for the winter. Liberty ships were converted into ore carriers, snow and freezing rain held off, and the Soo River's highest water mark in 40 years enabled the Coast Guard to extend the emergency summer load line for two weeks. **More ore** was moved on the Great Lakes last summer than in any previous time.

For Wisconsin dam builders at least, shortages aren't much of a problem these days. They have other things to think about—especially the **future of dam building.** A bill was introduced in the State Senate recently to prohibit hydroelectric dams or other obstructions on a number of navigable rivers and streams in order to preserve their scenic and recreational advantages. The bill prohibits hydroelectric developments capable of generating 100 kw. In waters not covered by the bill, plants could be built regardless of scenic beauty if they would save the consumer $2 or more a year.

In another part of the world, men are also interested in nature's effect on construction—but in a different way. The International Road Federation is doing its best to promote completion of the **Pan American Highway.** But legend and hearsay, they point out, rather than scientific knowledge are obstructing the joining of the two continents by a highway through the Darien section of lower Panama.

The highway from Alaska to the Argentine is 95 per cent complete, with breaks in northern Guatemala, Costa Rica, and Panama. One of the greatest barriers is crossing the raging Atrato River in Panama. But Dr. D. B. Steinman, eminent bridge engineer, believes that a bridge there would raise **no great engineering problems.** Some of the more prosperous Latin American countries have even offered to help the smaller countries finance their uncompleted sections.



Peter Kiewit (left) and Edward Palmer (right) have been named winners of The Moles Awards for 1953. A New York society for construction men, The Moles honor two men each year for outstanding achievement in their industry.

Merritt-Chapman & Scott will begin substructure work soon on Michigan's $95,000,000 Mackinac Bridge, the world's second-longest suspension span. American Bridge Division will erect the steel superstructure. Dr. D. B. Steinman is the designer.

Another one of Dr. Steinman's projects, the Mackinac suspension span in Michigan, will become active this spring. The world's second-longest suspension bridge will span the Straits of Mackinac, providing an important link between northern and southern Michigan. Engineers plan to have traffic rolling across the bridge by November, 1956.

Speaking of records, the Maryland State Roads Commission has awarded a contract for a 100-foot-long single-span **prestressed-concrete bridge,** the first in the history of the state. The plans call for nine T-shaped girders placed side by side. They will support a 30-foot-wide roadway. The 60-inch-deep girders will be post-tensioned by 16 cables, each containing 12 high-tensile-strength wires.

Manufacturers are also making records these days. Timken Roller Bearing Co. produced 250,000 finished bearings during December for an **all-time production record.**

The 1,000,000 single-cylinder gasoline engines made by Briggs & Stratton Corp. last year also mark another first in the industry.

Names in the News

M-C&S Executives

Louis E. Wolfson is the newly elected President of the construction firm of Merritt-Chapman & Scott, New York, N. Y. Ralph E. DeSimone, former President and a director, was named Board Chairman of Merritt-Chapman & Scott Overseas, Inc. Mr. DeSimone will direct the programming and development of new construction projects abroad.

Two other changes affect William Denny and Lewis M. Schott. Mr. Denny, formerly Vice President in charge of the company's New York Marine and Heavy Construction Division, is named Executive Vice President and General Manager, and a director. In his new capacity he will be in over-all charge of M-C&S operations in industrial, building, marine, and heavy construction, and of marine salvage and derrick heavy hoisting. Mr. Schott, Assistant to the President, becomes a Vice President, responsible for administration. He continues to serve as Assistant to the President.

Cassidy for International Commission on Large Dams

William C. Cassidy, a civilian engineer with the South Pacific Division, Corps of Engineers, U. S. Army, was recently appointed a member of the United States Committee of the International Commission on Large Dams.

The Commission, established in 1928 through the initiative of the French Government, is an affiliate of the World Power Conference and has its central office in Paris, France. Its objectives are to promote research and to collect experience regarding technical problems of design, construction, maintenance, and operation of large dams. These views and ideas are then exchanged through congresses and the publication of scientific documents. Membership of the Commission is composed of national committees and not of individuals.

Mr. Cassidy has been with the Corps of Engineers since 1929 and has served on various flood-control and dam projects. He holds the rank of major in the Corps of Engineers, United States Army Reserves.

Ferguson Is V. P. for Kidde

A. Kingsley Ferguson is the newly appointed Vice President in Charge of Industrial Engineering for Walter Kidde Constructors, Inc., New York, N. Y., and Houston, Texas. Mr. Ferguson joined the company in 1952 as Assistant to the President.

Portland Cement Promotes

The Portland Cement Association, Chicago, Ill., has appointed H. G. Wood to the post of District Engineer at its office in Columbus, Ohio. Mr. Wood, who has been with the Association since 1937, succeeds N. O. Wagner as director of its activities in Ohio and West Virginia.

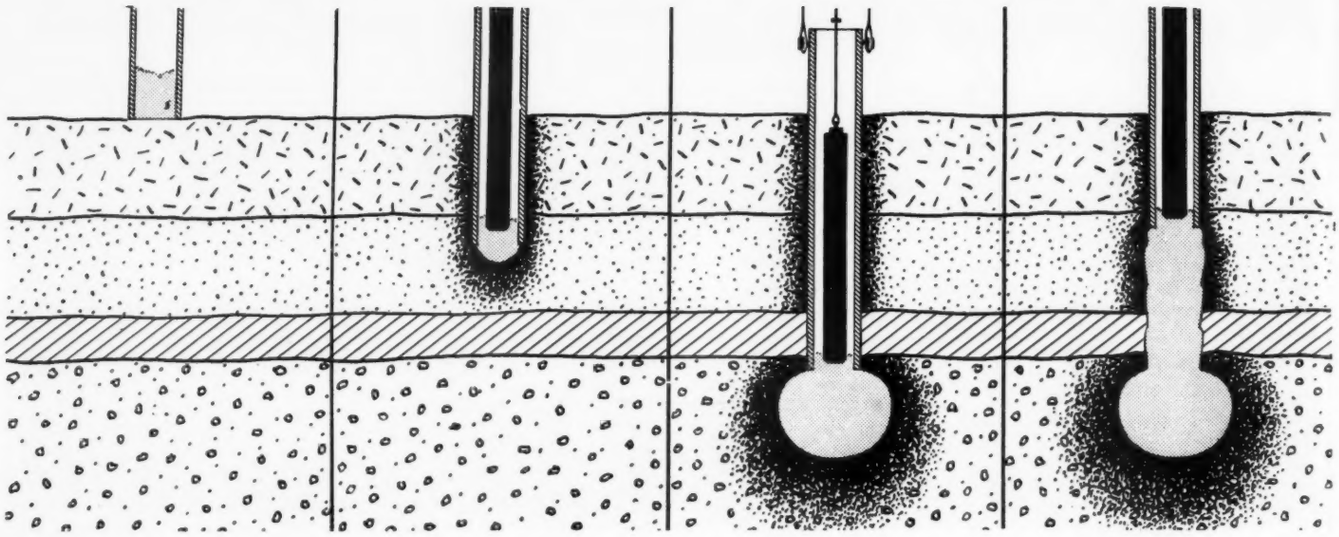
Another promotion is that of Ralph E. Spears, who is District Engineer at the Association's Salt Lake City, Utah, office. Mr. Spears joined the PCA in 1948.

Heads Turnpike Maintenance

John Newell, for 17 years a maintenance foreman with the Oklahoma State Highway Department, has been appointed Maintenance Superintendent of the Oklahoma City-Tulsa Turnpike, with headquarters at Stroud. He has been with the Department 22 years.

H. E. Bailey is General Manager of the Oklahoma Turnpike Authority.

M-C & S personnel: W. Denny, L. E. Wolfson, R. E. DeSimone, and L. M. Schott.



After the tube is positioned and plumbed, dry concrete is dropped to the bottom and tamped into a tight plug.

The ram is then dropped 10 to 20 feet, forcing the plug into the ground and dragging the tube down with it.

At the required depth, the tube is anchored to the frame and dry concrete rammed out into a bulb.

As the tube is raised, the concrete is rammed out, forming a rough column encased in highly compacted earth.

Pressure-Injected Spread Footings Support 12-Story Building

By ALBERT C. SMITH
Associate Editor

• SIDEWALK superintendents had a tough time following the recently completed foundation work on the new 12-story YMCA building in Newark, N. J. Through special observation windows in the high fence, they watched two odd-looking rigs drive the first Franki concrete displacement caissons used in this country to support a multistory building.

The unique caisson is actually a pressure-injected spread footing capable of taking a 120-ton load. Introduced into the United States a little over a year ago by the Franki Foundation Co. of Pittsburgh and New York, the system was developed 40 years ago in Belgium and has been used extensively throughout the world.

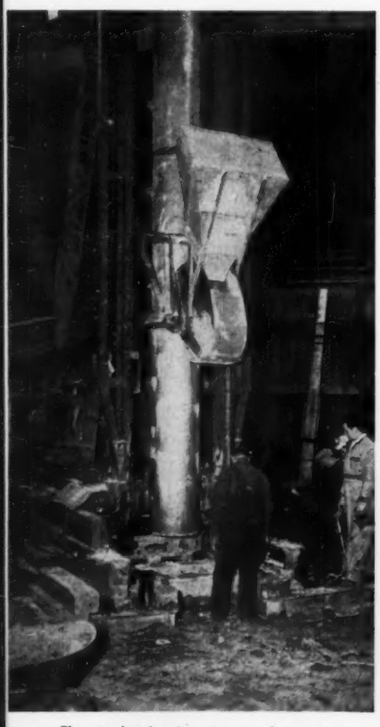
The Newark structure will be supported on 338 caissons placed in clusters ranging from 1 to 13. The minimum diameter is 21 inches and the average depth 14 feet.

Basically, the caisson is a rough concrete column with a bulbous footing—both encased in a sheath of tightly compacted earth. It is made without any soil excavation, thus taking advantage of the carrying capacity of the various strata encountered.

The driving rig consists of a heavy 20½-inch-diameter steel tube set up in the leads of a driving machine. A guiding head holds it in place. Inside the tube a 7,000-pound sash-weight-type ram operates as a drop hammer.

After the hydraulically moved rig positions and plumbs the tube, about 4 cubic feet of dry concrete is placed into a skip bucket that rides up and down the leads. The bucket is then lifted to the top of the tube and dumps the material inside. Now at the bottom the dry concrete is tamped lightly by the ram until arch action forms a tight plug. The ram is then dropped from a greater height, forcing the plug into the ground and pulling the tube down with it. Contrary to what one would imagine, the plug does not get

C. & E. Photo



The steel tube is set over the caisson location. Note the skip-type bucket.

One of the other rigs on the job drops its 7,000-pound ram to force the tube through the ground.

Concrete is placed in the bucket, carried to the top, dumped, and then rammed into the cavity left by the gradually lifting tube.

knocked out, but seizes the walls of the steel tube and drags it through the ground to the desired depth.

Compacts Earth

As the tube goes down it pushes the earth aside and compacts it. Although no regular formula is used, driving on the Newark job was discontinued when ten 4-foot blows sank the tube less than 1¼ inches, at the anticipated depth. This figure varies from job to job because a larger bulb can be used to offset a poorer soil condition.

At the desired depth, the tube is anchored by cables to the leads which prevent it from penetrating any deeper. Now with the tube anchored, the dry-concrete plug is easily knocked loose by the ram. It is not driven completely out of the tube (a mark on the cable indicates the amount of concrete remaining at all times) and no water or mud may enter.

Small batches of dry concrete are then dumped down the tube around the ram and are driven out by 150,000-foot-pound blows. This heavy ramming forces the concrete out against the soil, forming a bulbous base. This action not only increases the caissons' bearing area but also compacts the surrounding soil.

After the bulb is formed, the tube is raised as small charges of concrete are successively rammed out with 30,000-foot-pound blows. Lifting in 15-inch increments forms a 22 to 24-inch shaft with rough surfaces pressed against the already compacted earth.

Caissons Well Suited

Franki caissons are particularly well suited where the loads are very heavy and the soil reasonably cohesionless. This was the case on the Newark YMCA job. The 12-story tower portion of the building, which is 156 feet long and 45 feet wide, is cantilevered on all sides to provide continuous sash and to conform to the most modern architectural standards. Such a design requires few columns, but each is heavily loaded. The Newark structure, which would ordinarily have been supported by about 40 columns, will have only 16. Each column has a steel core and measures 36 inches x 24 inches. Maximum column load is 2,380 kips at basement level.

The soil had a top 15-foot layer of gravel and fill which was excavated for the basement. The next 15 feet was mostly fine-to-medium sand and gravel. This layer was supported by a stratum of highly compacted clay and silt with streaks of shale. Below this were even harder layers requiring core boring.

The consulting engineer's original design called for a huge spread footing under the entire main building. However, such a footing would have required considerable extra excavation to get below the bottom of the elevator shaft. This plan was then ruled out and consideration given to piling. After investigating several piling methods, the consulting engineer decided on the Franki caisson. It was felt that the highly compacted layer, approximately 15 feet below the basement level, could act as an excellent base for the bulbous part of the shaft. Also, the 120-ton capacity would mean fewer caissons and simpler layouts.

Load Tests

The engineer specified that two load tests be made at 200 per cent of the design load. The Board of Standards & Appeals of Newark based their approval of the Franki caissons on the results of these tests. The procedure to be used in testing was specified by the consulting engineer. Franki employed Pittsburgh Testing Laboratories to conduct the tests at the recommendation of the consulting engineer.

On December 1, 1952, a test was made on an 18-foot-long caisson with a nominal diameter of 22 inches. A timber crib was built on a steel and plank frame. A 300-ton Dudgeon jack raised the earth-filled box and put the weight on the caisson.

The load was applied in 30-ton increments until 210 tons were on. This part of the test took about 6 hours and the measured settlement was 0.011 feet. Four points were taken at each reading and the average settlement reported. Two hours later the load was jacked up to 240 tons and kept on for 58½ hours. The load was then gradually removed to measure rebound.

Results were as follows:

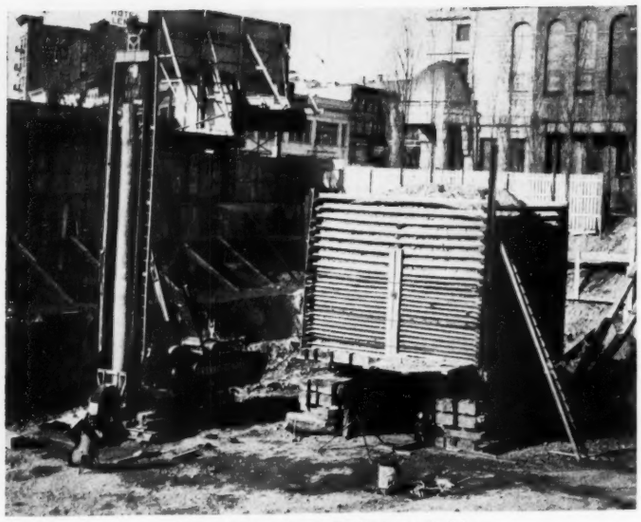
Gross settlement	0.017 feet
Rebound	0.006 feet
Net settlement	0.011 feet

On December 17, a similar test was made on a 14-foot caisson in another section of the site. The results were as follows:

Gross settlement	0.015 feet
Rebound	0.0105 feet
Net settlement	0.0045 feet

These excellent results under the 240-ton load brought approval from the consulting engineer and the Newark Building Department. Design load in each instance was 120 tons.

(Concluded on next page)



View of load test with Franki rig at the left.

An engineer from Pittsburgh Testing Laboratory adjusts the level before taking a reading. The test load was applied in 30-ton increments. *C. & E. Photo*

Pressure-Injected Spread Footings

(Continued from preceding page)

Driving Rig

Franki's equipment consisted of two driving rigs and one Bucyrus-Erie steam crane.

The unique rig is mounted on a 9½-foot-diameter turntable-type base. It can rotate about the base or move back and forth up to 30 inches. The entire unit walks by lifting itself hydraulically, sliding 30 inches, and then lowering itself. The base then rises off the ground, suspends itself from rollers in the frame, and moves another 30 inches. Such a system provides mobility, accurate positioning, and greater stability during driving. The rig is powered by a General Motors diesel engine. Each unit requires one operator, one oiler, and 4 workmen.

General specifications for Franki caissons permit a design load up to 120 tons. They also require that each caisson be installed within 1 inch of the exact center.

Concrete must be rammed into the bulb until no more can be packed in under five successive 140,000-foot-pound blows. In the shaft, concrete must be rammed out at the rate of three or four blows of 30,000 or 40,000 foot-pounds per 4 or 5 cubic feet of concrete.

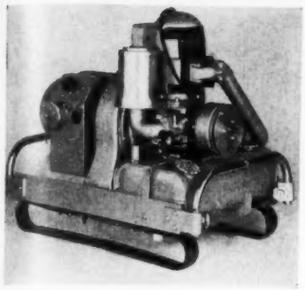
The specifications also require 3,000-pound-design concrete with not less than 6 bags of cement per yard and not more than 3 or 3½ gallons of water per bag. Strength at 28 days must be 4,000 pounds. Where reinforced, caissons have ⅝-inch-round rods.

Personnel

William Evans was General Superintendent for Franki Foundation Co. Emil Schmidlin was the architect and Olaf R. Egge, the consulting engineer.

Koehring Promotes Chandler

On January 1, 1953, K. R. Chandler undertook his new duties as District Representative for Koehring Co., Milwaukee, Wis., and its subsidiaries, Parsons and Kwik-Mix. His territory covers Utah, Arizona, Nevada, and California. He will make his headquarters at Stockton, Calif.



Lightweight Generator

A new dual-voltage 5-kilowatt generator light enough to be carried by hand has been announced by Homelite Corp., Port Chester, N. Y. It will carry a continuous load of 5,000-watt single-phase 60-cycle alternating current at either 115 or 230 volts. A 115-volt ac standard convenience outlet is supplied, together with a special waterproof 3-pole receptacle for connecting either 115 or 230-volt motors, tools, and appliances.

The unit has adjustable handles for 2 or 4-man carrying. The generator, complete with gasoline engine, weighs only 228 pounds.

For further information write to the company, or use the Request Card at page 18. Circle No. 627.

Leaf-Spray Fertilizer

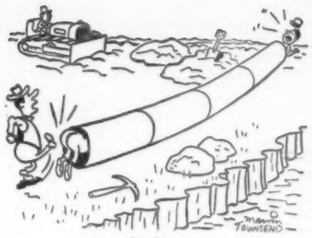
A water-soluble fertilizer that is sprayed on and absorbed through plant leaves has been developed by Monsanto Chemical Co., St. Louis 4, Mo.

This new product, called Folium, is a quickly soluble inorganic fertilizer of 20-20-20 composition (20 per cent nitrogen, 20 per cent phosphorus, 20 per cent potash). It contains a chemical which keeps the product in free-flowing non-caking condition and assists in the absorption of nutrients by the plant leaves.

For further information write to the company, or use the Request Card at page 18. Circle No. 672.

Material Spreader

A spinner-type wheel-driven material spreader is manufactured by Wausau Iron Works, Wausau, Wis. The Model C has no gears, motors, or complicated mechanical parts to get out of order. Drive is by friction through an adjustable spring-loaded spinner disk against a pneumatic driving wheel. Adjustment of the position of the wheel on the axle determines the speed of rotation of the spinner disk that controls the width of the spread. Width of spread is 8 to 24 feet. The quantity of material reaching the spinner is controlled by a cone in the hopper.



Ouch!

The spreader can be attached or taken from a truck by removing one pin. The hitch is adjustable to compensate for varying height and overhang of truck bodies. The unit spreads only when the body is raised and discharges equally well forward or reverse.

For further information write to the company, or use the Request Card at page 18. Circle No. 671.

Historic Wooden Bridges

Pennsylvania still has 175 covered wooden bridges on its highway system, at least five of which are known to be more than 100 years old. Two of these bridges are in Adams County and date from 1836 and 1850 respectively. They sway and rattle a bit, but the earlier one still carries 3-ton loads and the other is safe for 10 tons.

Chester is another county with two venerable covered wooden bridges. One—the oldest in the state—was built in 1807 and can bear loads up to 5 tons. The other, dating from 1850, is posted for 3-ton loads. The remaining member of the century club is in Northampton County. It was built in 1840 and can carry 4 tons.

Other comparative youngsters of 70-odd years or so will take 15-ton loads, but, of the remainder, some are not safe for more than 5, 7, 8, or 10 tons, while most are limited to 1 or 2 tons.

Pennsylvania is proud of its historic bridges, and even where the roads that used to cross them have been relocated and new bridges constructed, the Department of Highways has aided historical societies and similar groups to preserve them.

Catalog on Form Ties

Form ties for concrete work are the subject of a catalog issued by the Dayton Sure-Grip & Shore Co., Miamisburg, Ohio. The Snap-On is a wedge-type form tie and spreader for which no special tools are needed. Other form ties, anchor slots, hanging forms from structural steel, malleable inserts, and floor and wall plugs are also described.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 578.

Engineer Association Elects

Burnside R. Value of Seelye, Stevenson, Value & Knecht, has been elected President of The New York Association of Consulting Engineers, an organization representing over 40 engineering firms in the metropolitan New York area. Mr. Value succeeds J. H. Hennessy of Syska & Hennessy, Inc. V. L. Falotico, of V. L. Falotico & Associates, is Vice President; and J. M. Pryke, of Slocum & Fuller, Secretary. H. H. Bond was re-elected Treasurer.

Dredge Los Angeles Deepens Yacht Basin

Hydraulic Unit Removes Dangerous Sand Shoal from Harbor And Deposits Material Along Nearby Beach To Slow Erosion

• IN the turquoise-blue harbor at Santa Barbara, Calif., where the Pacific's shore currents slide southward just outside the rubble breakwater, modern dredging efficiency has come to the rescue of yachts and small craft crowded into a constricted anchorage. Last fall, a sandbar, deposited by the sea at the rate of 300,000 cubic yards a year, was handled 30 times faster than it was deposited. As a maintenance operation for the Corps of Engineers, Standard Dredging Corp. used the 27-inch hydraulic dredge "Los Angeles" to remove a 3-year deposit—about 1,070,000 cubic yards—of sand.

The job did not stop the shoaling. Just as regularly as time rolls around, the ocean continues its deposit of a sand shoal behind the breakwater, governed slightly by variables in waves and sand supply. Three years hence, if maintenance dredging waits that long, the shoal will again be built up in a 1,000-foot-long finger 7 feet above the water, with tapered edges along its outline. Last year's dredging marks the fourth time Captain S. A. Sellgren and a dredge named the Los Angeles have done the job. Sellgren knew exactly where all the permanent USED benchmarks were located—they're on the breakwater and waterfront sidewalk—and he laid out his dredge cuts without too much study.

How the Trouble Started

Santa Barbara's harbor trouble started back in the 1920's, when the sleepy, sunny little seacoast village began to attract wealthy people as a nice town in which to retire. In nearby Montecito lived the wealthy eastern yeast king, Fleischman. Santa Barbara's harbor was wide open and exposed to the sea, so whenever Fleischman anchored his yacht off Santa Barbara's beach, he did so at considerable risk.

As a civic betterment gesture, Fleischman donated the funds necessary to build a rubble-mound breakwater flanking the harbor from the west. It was designed to give a sheltered anchorage for his yacht, along with many other small pleasure craft then beginning to use the harbor.

Several things happened as soon as the breakwater was completed. The sea began to act up in a pattern now all too familiar to Corps of Engineers hydraulic experts. Inshore currents, swirling southward past the coast, began to drop suspended sand grains—picked up by wave action—just behind the end of the obstructing barrier. Simultaneously, the beautiful sandy beach along the city waterfront and to the south began to erode.

The detached breakwater trapped sand to such an extent that by 1930 the breakwater was connected to the shore. By 1933, sand had filled the space upcoast of the shore arm of the breakwater and had begun traveling around the structure to form a shoal in the harbor.

By 1935 most of the beach had disappeared and the situation was getting critical. The Los Angeles office of the Corps of Engineers, then mushrooming with flood-control work, did some maintenance dredging with its hopper dredge San Pablo, dumping the material out to sea. The first maintenance dredging by contract was done in 1938, the material being discharged on the beach. The job has been repeated six times since. The consistent input of about 900 cubic yards of sand per day and the steady erosion of the beach resembles the movement of snow around a snowfence on a windblown highway.

Routine harbor maintenance today is more of a necessity than ever. Pleasure craft have increased, a Coast Guard station has been established, and a Navy channel has been dug. So much a part of Santa Barbara is its harbor that the city and county contributed part of the funds for the cost of restoring the eroded beach.

Dredge Has Interesting History

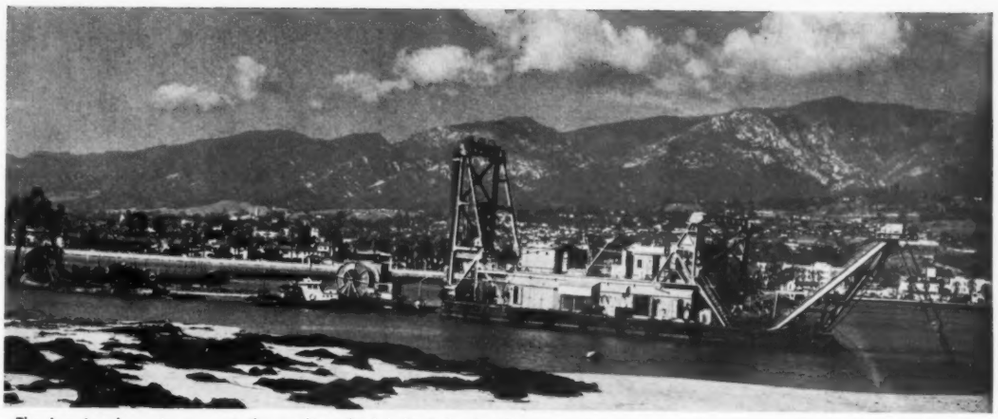
The dredge Los Angeles, which worked at Santa Barbara, was actually the Los Angeles II, so far enjoying a better fate than the first dredge with its name. The first Los Angeles dredged many jobs along

Mechanical restoration of Santa Barbara's eroded beach line was made via the Los Angeles' 27-inch pipeline, discharging at two points with shore valves. *Ray Day Photo*

the Pacific coast in the 1930's. In August, 1942, after completing the Santa Barbara maintenance job, she started for Morro Bay behind a tug. Off Point Conception the mighty Pacific turned from a peaceful ocean to a turbulent giant, battering the tow in fury. The Los Angeles foundered in deep water and was never salvaged.

Standard Dredging Co., meanwhile, had a dredging job committed but no dredge. Something had to be done, and fast. The United States was at war in 1942. Steel priorities were tight. Though pumps and winding gear were available, it looked as if there was not a single dredge hull or hull plate available in any west-coast harbor.

Far up in the mountains above Chico, Calif., Standard's officials finally found something that would do. Two 100-foot abandoned gold-dredge hulls could be bought. It took a dangerous near-impossible automobile trip even to look at the hulls. How could they be trucked out at all? A San Francisco trucking firm was willing to worry about that, so a subcontract was let. The hulls were safely cut down to 13 pieces and trucked to Terminal Island at Long Beach, where Standard maintains a waterfront yard.



The Los Angeles eats away at the sandbar shoal behind the breakwater as the camera looks across the harbor toward Santa Barbara, Calif. Pipeline anchorages and the cable reel can also be seen. *Ray Day Photo*

To make the 130-foot length needed, 30 feet was added in the center of one of the gold-dredge hulls. Unfortunately, the gold-dredge hulls were only 7 feet deep. The Morro Bay job was a shallow-draft affair, so the hull for the new dredge was built 130 feet long, 44 feet wide, and 7 feet deep. After the war, when priorities were relaxed, another 4 feet of draft was added to the 7-foot hull. But in case you believe the Los Angeles II wasn't built in a hurry, consider this: the original dredge went down in August. By October of the same year the present dredge was finished and ready to dig. Probably a dredge has never been built so rapidly.

A Powerful Rig

The Los Angeles is powerfully built for a 27-inch rig. It is all electric, taking 11,000-volt power from shore through 3,100 feet of submarine cable leading to a reel barge. This power is stepped down by transformers to 2,300 volts for use on the pump, cutter, and swing gear motors. Smaller auxiliary units also use power at 220 and 110 volts.

The main pump turbine motor is an Elliott, rated at 2,500 hp, but by using a heavy-duty motor-driven fan to blast cool air over the copper, it regularly delivers up to 4,500 hp. Peak horsepower is attained when the temperature of the copper armature is not above 80 degrees. Extra power is also obtained from the cutter motor by similar artificial cooling.

The big pump motor is hooked directly to the 27-inch pump by a long driveshaft, reaching from the motor's midship point to the pump, which is mounted on the dredge bow just behind the ladder. A 69-inch 4-vane pump runner was used at Santa Barbara to lift the sand and move it a maximum of 8,000 feet to the dump ground without booster power.

The bow mounting of the pump not only makes it accessible for deckhands and welders, but it takes it out of the hull, where an accidental break is always a source of danger. The pipeline discharging from the pump is also on top of the hull out of danger, where it does not have to be watched so carefully. The pump is a Standard Dredging Co. centrifugal design, made to com-

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Dredge Los Angeles Deepens Yacht Basin

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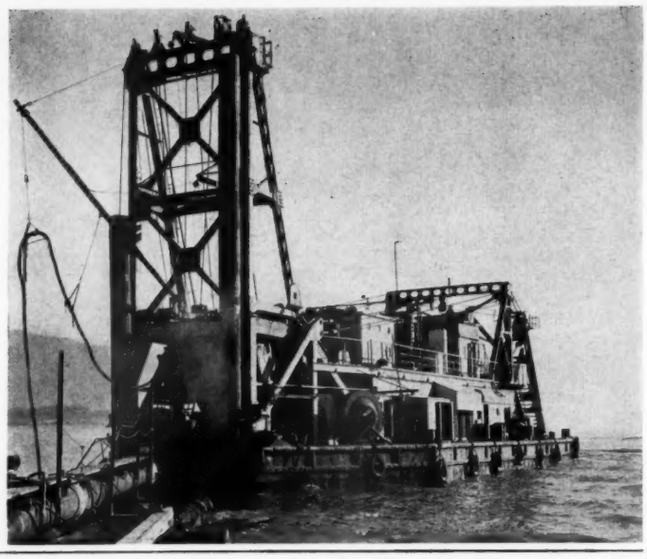
pany specifications by various foundries on the Pacific and Gulf coasts.

The cutter is also standard with Standard—no pun intended—and is a 5-blade affair with a back ring to stiffen the blades at that point. It is driven by a 500-hp Westinghouse motor through a gear-reduction box. The cutter shaft runs on a Cutless rubber bearing beneath the water, which is under constant water pressure from an electrically driven pump.



Taken from the stern, this shot shows spud and gantry details on the dredge Los Angeles. Cables from the special winches on the stern load down through a pipe well centered at deck level between the spuds.

Ray Day Photo

The ladder assembly is 76 feet long over-all, weighs 85 tons, and will let the dredge dig as deep as 45 feet. It is straight and is suspended from the ponderous A-frame over the front of the dredge hull. The suction intake is ordinary round pipe, but it has a patented automatic slugging regulator which opens and admits water whenever the intake pipe takes on too big a bite of solid material. The suction intake also has a sliding rubber sleeve to make the angular transition between the digging angle and the pump mounting.

The swing gear setup on the Los Angeles consists of a 5-drum hoist manufactured nearly half a century ago by Golden State Mining Co. It is driven by a 200-hp Westinghouse electric motor. Its 5 drums hold the ladder-hoist cable, two swing lines, and two spud cables. Swing cables are 1¼ inches in diameter and 600 feet long, permitting a 225-foot cut with ease. The two spuds are steel sticks 30 inches in diameter, 70 feet long, and weigh 22 tons each. They are set in spud wells mounted externally on the hull, and digging is done off the port stick.

Another feature of the dredge is a good machine shop amidships, including two lathes, a drill press, a power grinder, a power hacksaw, and small tools necessary for repair work.

The operating room or pilot house contains the usual gages and controls necessary for the operation of the machine at top efficiency. Gages in front of the operator record main-motor kilowatts, swing-motor horsepower, cutter-motor amperes, water pressure on the Cutless rubber bearing, pipeline pressure, suction vacuum, and pump rpm. On an average day, digging 26,000 cubic yards of sand, the Los Angeles operates 22 hours and 55 minutes, uses 56,000 kilowatt hours of electric power, digs at an average suction vacuum of 16 inches, and sends the 8-percent-solids stream of material out of her pipeline at a pressure of about 90 psi. Her average pump rpm is about 316.

Pipeline Details

The discharge pipeline from the Los Angeles consisted of both floating and land line, with the floating line laid in a straight line to the beach, and the land line then leading down the beach line toward the dump area. Floating pipeline totaled about 3,500 feet in 50 and 100-foot joints. Under each 50-foot section were two 56-inch x 24-foot catamaran-type steel pontoons, stiffened by 12 x 12 timber strongbacks. Four similar pontoons supported the 100-foot sections. Captain Sellgren let his towing cables remain in place on the pipeline sections while they were

in use, so they could be moved quickly in an emergency or when the job was finished. A plank walkway with a cable guardrail made the pipeline safe to walk on, even in a relatively rough sea.

Floating pipeline joints were a Kinco-type modification of dredge ball joints and had been improved by Standard Dredging Co. They were easy to make up, and in case of water traffic, easy to break apart. The barge which carried the floating line at its right-angle point behind the dredge was securely anchored.

From 7,500 to 8,000 feet of 27-inch steel land line in 20-foot sections was available for shore use. Joints on this pipe were ordinary slick-type fittings, but they were exceptionally good fittings. Rolled by Western Pipe & Steel Co., the land line is one of the most leakproof pipelines developed recently. Standard Dredging Co. also uses some Naylor pipeline, though none of this line was used on the Santa Barbara job. Auxiliary equipment on the dump included several sets of Y-gates for controlling the discharge of material. For pipeline and timber handling, there was a Caterpillar D6 with a Hyster side boom. Another Caterpillar D6 with a dozer blade helped to leave the dredge fill smooth.

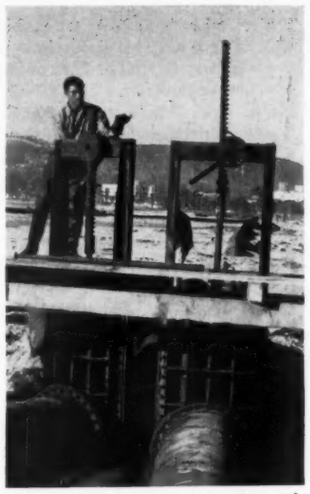
Unusual Cable Anchorage

An unusually good system of digging without spuds in rough water has been perfected and installed on the Los Angeles, so rough weather was not too much of a deterrent to the big dredge. Two winding reels from LST's were purchased, along with the Chrysler engines and torque converters which drive them, and were mounted on an auxiliary deck above regular deck level on the stern of the dredge. Cable leads from the drums pass out to heavy sheaves between the spuds and down through a pipe well at deck level. This arrangement permits a lead out to the anchors below the water line, giving excellent stability in rough weather.

There were enough drums on the device to lay anchor lines to each side of the dredge, along with a tail or hold-back line directly astern. Steps ahead were made by slacking the stern and starboard-quarter anchor lines and taking up on the other line.

Auxiliary Craft Used

Auxiliary craft employed to handle the Los Angeles and the project were kept to a minimum. Standard Dredging Corp. used the 200-hp tug Jean to tow the dredge to and from a job. A 100-hp tender named the Rosalie handled the dredge and an anchor scow at the job. In addition to the anchor scow, there were a cable barge and 6 winch barges. Passenger traffic to the dredge was handled by a war-surplus LCVP, which was usually so undependable that the dredgemen christened that craft the Misfit. With the exception of the Misfit, however, everything else was top-notch equipment.



Here a shore man operates a Y-control valve on the discharge line.
Ray Day Photo

How Job Was Dug

Captain Sellgren dug the Santa Barbara job much the same as he had dug it before. Project depth next to the breakwater was 30 feet, with an allowable overdepth of 2 feet; project depth farther in toward the center of the harbor was 20 feet, with 2 feet of allowable overdepth.

A 225-foot pilot cut was made along the inshore end of the area to give the Los Angeles operating room. Other cuts were made, adjacent to each other, to take the material out of the dredging area. The last cut was made close by the breakwater, leaving a 4 to 1 slope between the anchorage limits and the base of the rubble mound. There was also a 4 to 1 transition between the 30 and 20-foot dredging.

The material is mostly fine beach sand, washed down to the sea by surface water and then picked up by inshore waves and currents. It makes excellent material for beach restoration. The material was deposited by the pipeline to make a broad 300-foot beach approximately 15 feet above low tide. The outer edge was allowed to fall away at its natural angle of repose, which is about 20 to 1.

The beach was restored by the Los Angeles at the rate of 25,000 cubic yards a day, working 6 days per week, 24 hours per day. The dredge made a peak performance of 35,000 cubic yards several times, but such high production diminished as

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Dredge Los Angeles Deepens Yacht Basin

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the length of the total pipeline increased. Eventually the dredge pumped through 8,000 feet of line, without a booster

By the end of last year the job was completed, and the small craft of Santa Barbara Harbor again had a good anchorage for several years to come. Coming up in the near future is a big Navy job at Port Hueneme, down the coast, where tremendous sand accretions near the breakwater will be used to restore a rapidly eroding beach near the Navy training base. The Los Angeles should be in a good position for her owners to bid on the project, which will also be supervised by the Corps of Engineers.

Personnel

Standard Dredging Corp. maintains a district office at Los Angeles, which is under the supervision of George Daneri, Vice President and Los Angeles District Manager. Captain S. A. Sellgren skippered the Los Angeles, with Arne Throndsen Chief Engineer, G. E. Sellgren Deck Captain, and J. J. O'Neill in charge of office engineering.

Col. W. P. Schuler is Los Angeles District Engineer for the Corps of Engineers, with William J. Leen in charge of operations and H. W. McOuat in general charge of planning and engineering field work. I. R. Dunbar was Field Inspector.

March is American National Red Cross month. Your nearest Red Cross chapter will tell you how to join this humanitarian organization.

Blown Concrete Used In Fireproofing Shaft

Hose-applied vermiculite concrete was used recently to fireproof a hotel elevator shaft in Spokane, Wash., because conventional fireproofing methods were not possible. To meet a municipal 4-hour fire rating, two coats of Blocrete were blown on the walls of the shaft.

The job was done in 10 days, and eliminated conventional forming, which would have put the hotel's service stairway out of use during the job. This stairway is next to the elevator and the inside of the shaft wall is on the same studs as the stairway wall. The stairway is decorated with wallpaper and finished woodwork, and these would have had to be replaced if conventional forming had been used.

The concrete met the fire rating because vermiculite aggregate is incombustible and resists the spread of flame, according to the manufacturer, Zonolite Co., 135 S. LaSalle St., Chicago 3, Ill.

Blocrete was applied 3½ inches thick as the plasterers worked their way up the 7-story shaft. A second coat ½ inch thick was blown on as they descended. No finish was applied, because the concrete was sufficiently smooth.

Central Construction Co., the general contracting firm, placed the reinforcing, steel corner angles, and cross members used on this job. The actual application of the Blocrete was sublet to R. L. Montelius, another Spokane company.

For further information write to Zonolite Co., or use the Request Card at page 18. Circle No. 673.

Wrought-Iron-Pipe Data In Spanish and English

To aid technicians in Latin-American countries and those in this country who specifiy for the export trade, A. M. Byers Co., Clark Bldg., Pittsburgh 22, Pa., has published a bulletin in Spanish and English containing data on wrought-iron pipe.

The bulletin lists the major uses of wrought iron for corrosion-resistant services including building, general construction, underground piping, and marine applications.

Consolidated tables show size and dimensional data for standard-weight pipe, line and drive pipe, and extra strong pipe. Complete information is included on diameter of pipe, weight in pounds per foot, test pressure per square inch, wall thickness, and number of threads per inch. Specifications cover butt-welded and lap-welded pipe, as well as diameter and length of couplings.

Listed separately is information about wrought-iron-pipe nipples and welding fittings.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 696.

Beavin Joins Engineer Firm

Porter, Urquhart & Beavin is the new name of Porter-Urquhart Associated and O. J. Porter Co., Consulting Engineers, New York, N. Y. The change is brought about by the entry of Benjamin E. Beavin, Sr., into the firm last January.

Moving Big Crusher Is Major Operation

New York Trap Rock Corp. Is Shifting a 175-Ton Unit From The East to the West Side of the Hudson River

• A $600,000 contract to dismantle a stone-crushing plant at Cold Spring, then move it and re-erect it at Haverstraw, N. Y., was signed last month between The Nicholson Co. and New York Trap Rock Corp., both of New York City. Another $250,000 will be required for new machinery and steel which will be purchased by New York Trap Rock and installed by Nicholson.

The major problem in the dismantling, moving, and erecting job is the handling of a 175-ton Traylor stone crusher. It is one of the largest ever built and will handle stones up to 5 tons in weight and break them into 100-pound pieces.

To Cross George Washington Bridge

Although the shortest distance between two points is a straight line, in this case a straight line would mean moving the crusher by scow across the Hudson River from Cold Spring to Haverstraw. It would require shoring operations on both sides of the river, and would be costly and time-consuming. Consequently, Trap Rock will disassemble the crusher, mount the parts on a trailer, and truck them down Route 9E across the George Washington Bridge and up Route 9W to the quarry operations at Haverstraw. Bear Mountain Bridge is nearer to Cold Spring, but is not able to handle the crusher and trailer weight, since one of the parts will weigh 39 tons.

Two smaller crushers, 2,428 feet of conveyor belt, over 2,000 cubic yards of concrete, and some 300 tons of steel will be needed at the new site, in addition to the 175-ton crusher, and other facilities which will be moved from Cold Spring.

The project will be started this month. It is estimated it will require several weeks to complete the move, and a total of 8 months for the erection of the new crusher facilities to tie in with the flow of material from present Haverstraw operations. The stone will be reduced in size at the new quarry level and will be conveyed by belt to secondary crushers. The finished product will be carried under 9W and over the West Shore Railroad tracks to dock facilities on the Hudson.

The large fly wheel of the 175-ton Traylor stone crusher dwarfs Leo Fox, supervising from the balcony, upper right.

Crushed Stone in Demand

The facilities are being erected at Haverstraw, at an estimated total cost approaching $1,000,000, in anticipation of a continuation and a possible increase in the consumption of crushed stone for major highway construction, street and road-repair work, and in concrete construction for home and commercial building, air fields, and bridge construction. Much of the plant's facilities will be used to supply such work as the New York State Thruway, the Tappan Zee bridge crossing, and other vital links in the highway program.

Preservation of Scenic Beauty

Trap Rock is expanding its op-

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Moving Big Crusher Is Major Operation

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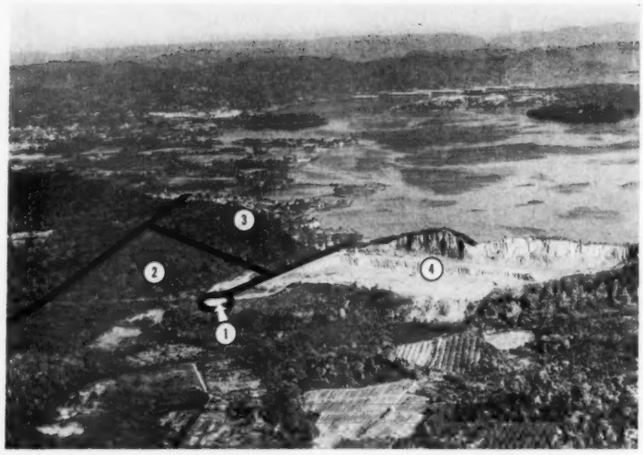
erations at Haverstraw by developing a third level of quarrying operations at its present location and preparing for the opening of a new quarry north of the Short Clove Road in the town of Haverstraw.

Since the start of operations at Haverstraw in 1927, William P. Foss, III, Trap Rock's President, pointed out that the company has been following a quarrying plan which avoids defacing the scenic beauty of the Hudson. Construction and road-building programs requiring crushed stone, however, may make it necessary for the local courts to reconsider the anti-quarrying zoning of some of the company's land in Clarkstown so that this area may be made available for quarrying.



An aerial view of the Haverstraw quarry of New York Trap Rock Corp. (1) marks the place where new quarrying will be carried out; (2) is the area which was re-zoned to prohibit quarrying operations; (3) is an unrestricted area where Trap Rock may be forced to quarry should the ban be continued; (4) shows the face of the present quarry.

New P&H District Appointments

Gordon E. Leopold has taken over the position of District Manager in the Minneapolis, Minn., office of Harnischfeger Corp., Milwaukee, Wis. A graduate civil engineer and a veteran of World War II, Mr. Leopold joined the staff of P&H in 1951.

George A. Schmus is now Manager of the Parts and Service Department. In the past Mr. Schmus served the company in the Purchasing, Credit, and Stores Control Departments, and since 1937 he had been Traffic Manager. Next year Mr. Schmus will celebrate his 25th year with Harnischfeger.

Steel Gains

The total 1952 output of steel in this country was 93,149,000 tons, third highest in history.

All-Welded Trusses Extend Above Roof

The east extension 100 percent erected. Top right: two 250-foot camel-back trusses for the north extension are on welding skids.

• UNIQUE heat and steel-saving techniques were used to enlarge the Fairchild Aircraft plant at Hagerstown, Md. Extensions on two sides of the main factory used all-welded bowstring trusses with their top five-eighths extending above roof level. The all-welded construction saved 15 per cent of steel, and the exposed truss feature provided a lower roof and less space to heat. In addition, the 200-foot span furnishes a floor area free of vertical columns.

The long-span trusses have a mid-span height of 40 feet, and are 125 feet on center. The bottom chord is about 47 feet above the finished floor. The chord members are 36-WF sections with webs parallel to the ground line. Verticals are also 36-WF sections.

When the roof covering is placed, the top chord extends about 25 feet above the roof and is exposed to view. The huge bowstring trusses are cross-braced with 125-foot-long parallel chord trusses connected at the verticals. These parallel chord trusses also support the roof and 10-ton monorail cranes.

Erection

The ends of the bowstring truss members were prepared for welding in the shop, assembled on the ground in the field, and the truss erected, using three sections. Steel was supplied and erected by Lehigh Structural Steel Co. of Allentown, Pa.

With the flanges of the chord members parallel to the ground, the trusses were assembled on a welding bed which was constructed at the site. After fitting, the truss was partially welded in the first position. The details were so arranged that the whole truss would disassemble into three parts—the right half, the left half, and the center tee. By disassembling the truss and using two cranes with a special lifting device the truss was turned through 180 degrees to position 2. Additional welding was added, the truss again turned 180 degrees into position 3, which was the same as position 1, and the welding on the skids was then completed. The truss was then disassembled into three parts and hauled to the final building location.

The right half of the truss, weighing 37 tons, was raised into position with one end landed on an existing building column and the other end on a temporary erection tower. After the right half of the truss was tied into the main framing of the structure, the left half, weighing 36 tons, was raised into position. After this half was tied into the main framing of the structure, the center-tee section, weighing 11 tons, was placed. Finally the three truss joints, one on the bottom chord and two on the top chord, which were not welded on the ground, were welded in the erected position and then the erection tower was removed.

Lifting Device

All of the handling in the field was done with crawler-type cranes. By placing the lifting device at the center of gravity of the section, two cranes could be attached to the triangular lifting plate. Two cranes were used to raise the half sections of the camel-back trusses. When the half section was landed on the building column and the temporary erection tower, the load on the one crane was released and the other crane continued to guy the half truss. With the one crane guying the truss, the other crane filled in the 125-foot parallel chord trusses which framed to the verticals of the bowstring trusses. The 125-foot parallel chord trusses were shop assembled on the ground in the field and finally raised into position in one piece using one crawler crane. These 125-

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All-Welded Trusses Extend Above Roof

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foot trusses had a prescribed camber and again were assembled and welded in accordance with the prescribed sequence and procedure.

All welding was performed in accordance with prescribed sequence and procedure. The principal welds are of the double-V butt type. One truss joint required as much as 93 pounds of deposited weld metal and the completed truss required 470 pounds of deposited weld metal.

X-Ray Welds

Early in the field-erection state of the construction, the management of Lehigh Structural Steel Company decided to secure final confirmation of the detail joints and soundness of the welds on the bowstring trusses.

Fairchild Aircraft plant, Hagerstown, Md. A 250-foot single-span all-welded truss.

Therefore, X-ray technicians of the Metlab Company were engaged to X-ray the completed welds. X-ray films of all the principal joints in one of the trusses and the three welds in the final position for two of the trusses were developed using radioactive cobalt 60 for securing the pictures. These X-rays confirmed the soundness of the design and the welds.

It is of interest to note that this contract required 2,455 tons of structural steel. About 16 miles of ¼-inch equivalent fillet welds were made in the shop and about 14 miles of ¼-inch equivalent fillet welds were made in the field.

Closeup of half of a 250-foot truss for the north extension. In the foreground is a temporary erecting tower.

SAE Earth-Moving Conference To Meet in April

The Fourth Annual Earth-Moving Industry Conference of the Society of Automotive Engineers will be held on April 8 and 9 at the Pere Marquette Hotel in Peoria, Ill. The Central Illinois Section of SAE will again sponsor the conference.

The opening address is to be given by R. S. Stevenson, Executive Vice President, Allis-Chalmers Mfg. Co., Milwaukee, Wis. Technical sessions of the 2-day conference will include papers on electric drives; asphalt-paving machinery and methods; air-compressor equipment; use of strain gages in designing; transportability of earth-moving equipment; foreign competition; and predictions of the future.

All inquiries should be directed to Harlow H. Piper, Engineering Department, Caterpillar Tractor Co., Peoria, Ill.

How a Diesel Engine Works

An illustrated booklet that tells, in simple nontechnical language, how diesel engines work has been released by the P&H Diesel Division, Harnischfeger Corp., Crystal Lake, Ill.

"What You Should Know About Diesel Engines" uses the grade-school-primer technique to help the reader understand the diesel's operation. It compares the diesel with the gasoline engine and explains the working of 2-cycle and 4-cycle types of diesels. It also reports the latest advance in modern diesel-engine design.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 670.

Track-Type Tractors

A new booklet on track-type tractors has been issued by Caterpillar Tractor Co., Peoria 8, Ill. Eleven on-the-job photos show the company's tractor equipment working for construction companies and municipalities. Some details are given on the components of the tractors.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 584.

"Must Decide Soon" on Atomic Energy's Future

At the 13th Annual Award Dinner of The Moles (national association of heavy-construction men) last month, Dr. T. Keith Glennan, President of Case Institute of Technology, Cleveland, Ohio, and former member of the Atomic Energy Commission, expressed the opinion that an early decision must be made on the future status of atomic energy.

The United States, Dr. Glennan reminded his listeners, has now invested $12 billion in atomic-energy-production facilities, all of which have been under strict Government monopoly. The Administration, said he, "must decide very soon whether it will keep this vast undertaking a Government monopoly for military purposes or open it up for development in constructive ways by private industries".

The two men honored at the dinner on February 4 at the Waldorf-Astoria Hotel were Peter Kiewit, of Omaha, Nebr., and Edward P. Palmer, of New York (see C. & E., Nov., 1952, pg. 34). George Ferris and J. Rich Steers, both New York contractors, presented the awards to Mr. Kiewit and Mr. Palmer respectively.

A Hard-Facing Alloy

A new hard-facing alloy manufactured by Coast Metals, Inc., of Little Ferry, N. J., is said to have resistance to abrasion at high temperatures, the ability to withstand attack by molten copper, and improved welding characteristics.

CM-119 can be applied with any good arc-welding process. It will weld over itself and more ferrous materials without cracking, checking, or porosity, the manufacturer states, a fact which permits patching where previously full replacement has been necessary.

For further information write to the company, or use the Request Card at page 18. Circle No. 638.

Folder on Heating Units

A folder describing space heaters, preheating torches, and salamanders is available from the L. B. White Co., Onalaska, Wis.

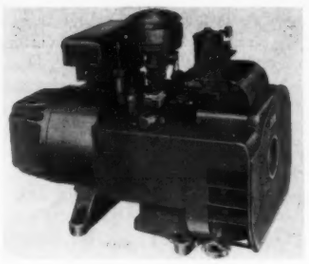
The portable space heaters shown have a 14-inch fan that draws cold air off the floor, heats it, and then circulates it. The salamanders can be suspended below the scaffold floor to keep materials from freezing and to keep men warm enough to work.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 605.

Builds Liquid-Oxygen Plant

A new liquid-oxygen plant for the production of liquid oxygen, nitrogen, and argon will be constructed by Air Reduction Sales Co. in Riverton, N. J., 10 miles northeast of Camden. Production is scheduled to begin next year, and the products will be delivered within a territory stretching as far south as the Carolinas and north into New England.

Air Reduction Sales Co. is a division of Air Reduction Co., Inc., 60 E. 42nd St., New York 17, N. Y.



New Generating Plant

A new air-cooled gasoline-powered electric generating plant is offered by D. W. Onan & Sons Inc., Minneapolis, Minn. It has a new vacuum cooling system which draws cold air through the generator and over the engine and discharges heated air out of an 8 x 12-inch vent. The Model 5CW is said to weigh around 300 pounds less than water-cooled models of the same wattage. The unit comes in 5,000 and 10,000-watt capacities.

For further information write to the company, or use the Request Card at page 18. Circle No. 617.

Gustin-Bacon Sales News

The Kansas City Sales Division of Gustin-Bacon Mfg. Co., Kansas City, Mo., has a new Manager—George R. McMullen. In his new position, Mr. McMullen will handle sales of the company's glass-fiber insulation and industrial products in a 4-state area.

Barth Gilchrist has been appointed Manager of the company's Division at Philadelphia, Pa., and Leonard E. Feitt is his Assistant.

Management

Good Job Management Cuts Equipment Delays

BPR Statistics Show Comparative Time Losses on Various Jobs Using the Same Type of Key Equipment Units

• IMPROVEMENTS in road-building equipment have done much to provide better highways across the nation in recent years, but to contractors responsible for highway jobs they have brought new problems of their own. Construction-job management is, more and more, a matter of know-how. This is the theme of a paper presented at the 32nd Annual Meeting of the Highway Research Board by Fred B. Farrell, Chief of the Highway Cost Section of the Bureau of Public Roads.

Mr. Farrell concentrates on the extent to which equipment can be kept in productive operation on its scheduled tasks during the course of any job, though he recognizes the various other aspects of job management which any contractor must bear in mind if he wants to stay in business. The one fact on which all agree is that a smooth fast-moving job will make more money than a slow-moving one beset by numerous delays and equipment breakdowns. On this question of equipment Mr. Farrell has some interesting statistics derived from field studies made by the BPR over the past 5 years on highway-construction jobs. The studies were conducted in most of the states on some 140 separate jobs, for periods of about 3 weeks each. Weather delays were excluded from the findings.

Major and Minor Delays

Key equipment units were found to be engaged on actual productive work about 58 per cent of the total available working time. The remaining 42 per cent of the time was lost in various kinds of delays (interruptions to the routine cycle of operation), nearly half of which were "minor" delays of less than 15 minutes each in duration. Even on the best-managed jobs, says Mr. Farrell, these small delays take their toll of lost production, and their cumulative effect may well mark the difference for the contractor between making or losing money. As to the longer or "major" delays, of 15 minutes or more each in duration, these accounted in the statistics for a little over half of all lost time on the average job. Even though a job can be shut down temporarily during many such delays, so as to keep costs to a minimum, expenses like maintenance of detours and overhead and demurrage charges continue. Also, labor becomes dissatisfied.

The extent of lost time shown in the BPR figures varied, of course, according to the type of work and the class of key equipment. The following table shows the average extent of major and minor delays for five selected groups of equipment:

No. of units studied	Class of key equipment	Extent of delays in percentage of available working time Major	Minor	Total
29	Asphalt plants	24	24	48
23	Dual-drum paver	20	24	44
40	Power shovels	16	30	46
68	Scrapers, crawler tractor-drawn	22	9	31
74	Scrapers, rubber-tired tractor-drawn	27	15	42
	Average	22	20	42

Comparison Between Jobs

Taking the same five types of equipment, Mr. Farrell next breaks down their record into two job categories—Group A represents jobs with the least delays, and Group B those with the most delays. This, roughly, means that the Group A jobs enjoyed more effective management than the Group B jobs, though no absolute comparison is possible due to varying individual conditions. The following table shows the comparison of Group A and Group B jobs with respect to the extent of total time losses:

Class of of key equipment	Extent of delays in percentage of available working time Group A (Jobs with least delays)	Group B (Jobs with most delays)
Asphalt plants	27	66
Dual-drum pavers	32	50
Power shovels	29	62
Scrapers, crawler tractor-drawn	12	39
Scrapers, rubber-tired, tractor-drawn	23	53

This breakdown suggests that there is opportunity on many projects to improve efficiency. To achieve such an improvement, however, requires a knowledge of exactly what the principal trouble spots are for each type of operation. Even with such knowledge, the contractor will often find that as he reduces one source of delay, other sources will become prominent. He can never afford to relax his alertness to the changing situation.

Considering each of the five classes of key equipment in turn, here are Mr. Farrell's conclusions on how the principal time losses occur.

Asphalt Plants

Plant maintenance and repair, and shortages of dried aggregate and asphalt, accounted for most of the difference in time losses between Group A and B jobs on which asphalt

(Continued on page 22)

Denver Water Works crew lowering 8" pipe. Five crews of 9 men each laid from 18,000 to 35,000 feet of new pipe per month (according to weather conditions) with the "QUICK-WAYS".

"QUICK-WAY" moves alongside trench backfilling as fast as men can tamp dirt. Note extra wide backfiller attachment which was specially built for this work.

8300 feet of new conduit was built in mountains to extend Denver's water supply. Here, two miles above sea level, a "QUICK-WAY" crane speeds work by moving heavy concrete forms.

GALION 503 Tandem Drive ECONOMY GRADER

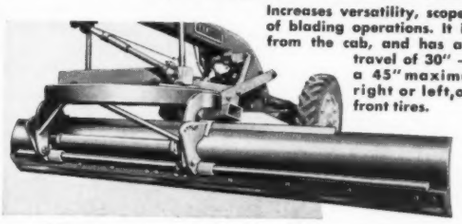
Gives you more "BIG GRADER" features than any other!

*** LEANING WHEELS**

Hydraulically operated from cab. Provides "big grader" maneuverability, front end stability, and traction on soft or sloping ground.

*** HYDRAULICALLY SHIFTABLE MOLDBOARD**

Increases versatility, scope, and ease of blading operations. It is operated from the cab, and has a horizontal travel of 30" — providing a 45" maximum reach, right or left, outside the front tires.



Other "special job" equipment available for increasing the usefulness of the Galion 503 Grader includes Snow Plow, Loader, Windrow Eliminator, and Bulldozer.

STANDING HEIGHT CAB *

All steel and rubber-mounted safety glass. Operator can work in a standing position with ease and unequalled visibility of work. Full-height hinged doors. Top half of cab easily removed. Adjustable windshields front and rear.

LARGE SIZE FRONT TIRES

Size 6.00-20 front tires are standard. Two larger sizes (7.50-20 or 8.25-20) available. *

*** FRONT SCARIFIER**

"V"-type hydraulic scarifier placed in the same position at front end of grader as on big graders. Completely visible from cab when in use. Downward pressure causes no loss of traction by the tandem drive wheels. Replaceable points.

PLUS THESE STANDARD FEATURES

Positive four-wheel tandem drive . . . extra-strong, box-type, high-arched frame . . . heavy 4" solid steel drawbar with heavy-duty ball-and-socket connection to head block . . . extra-large hydraulic cylinders and direct drive hydraulic pump . . . 4 forward speeds 2.3 to 20.4 m.p.h. and high reverse of 4.3 m.p.h. . . . rugged high-clearance front axle . . . weight —8,720 lbs., blade pressure 4,975 lbs. — both without extras.

GASOLINE OR DIESEL ENGINE

A 40 h.p. gasoline engine is standard equipment. A 36.7 h.p. diesel engine is available. *

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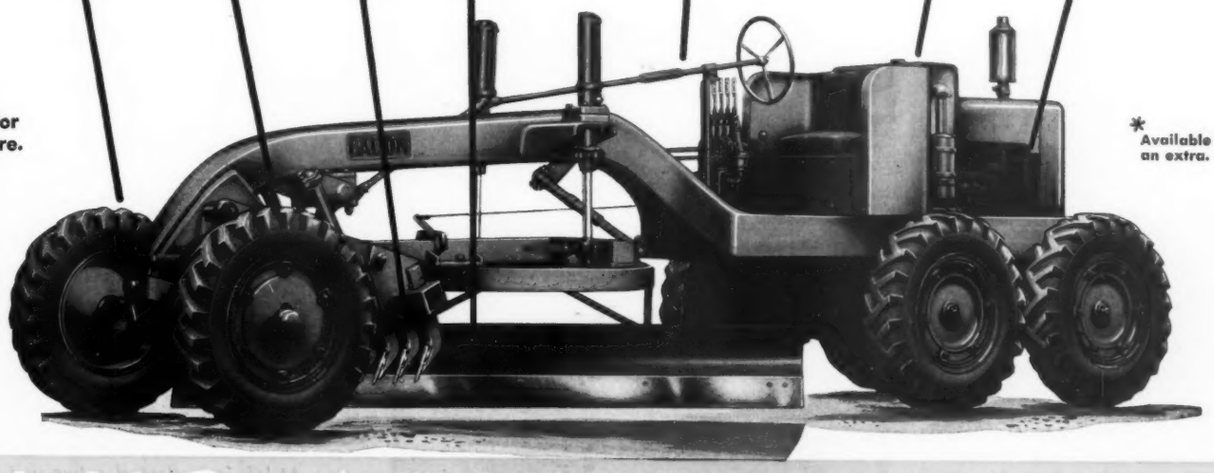

* Available as an extra.

Gets Jobs Done in "BIG GRADER" Style!

DITCHING

GRADING

SCARIFYING

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A Thrifty Buy

With the GALION 503 you can put your road and street maintenance program in high gear — and do it without straining the budget!

On new construction it will save thousands of dollars in investment and operating costs over the costs with heavier graders.

Write for literature - TODAY!

ESTABLISHED GALION 1907

THE GALION IRON WORKS & MANUFACTURING COMPANY

General and Export Offices, Galion, Ohio, U.S.A. Cable Address: GALIONIRON, Galion, Ohio

Good Management Cuts Equipment Delays

(Continued from page 20)

plants were used, according to the BPR statistics. Delays due to lack of hauling units were rather large for both groups. An obvious remedy for this would seem to be the acquisition of more units; but then again the hauling units themselves often have to waste time waiting in the plant to obtain a load. It will be seen, therefore, that the contractor must determine the proper balance between plant capacity and hauling-unit capacity under any given set of conditions. Waiting on the dryer to dry the aggregate was another substantial part of the difference in time losses between Groups A and B. The capacity of the dryer is a significant factor affecting production on many plant setups.

Total delays in asphalt-plant operations came out in the BPR figures as 27 per cent of available working time under Group A, and 66 per cent under Group B.

Dual-Drum Pavers

Where portland-cement concrete-paving jobs were concerned, Mr. Farrell found that two of the principal causes of delays in dual-drum operations were associated with the batch trucks, of which there were not always enough waiting in line at the paver. The Group A jobs had 2 to 3 batch trucks waiting, while the Group B jobs averaged only 1 to 2. The extra margin given by the additional truck made all the difference. The other batch-truck trouble was caused by their slow backing onto the paver skip or their slowness in discharging the batch into the skip. A capable dump man (or spotter) to direct the batch trucks pays off in such cases. Other time losses proved to be due to shortages of materials (principally cement) and to repair and maintenance to the paver.

Total delays: Group A—32 per cent of available working time; Group B—50 per cent.

Power Shovels

Power-shovel operations are subject to numerous delays, many of which Mr. Farrell says are difficult to catalog in such a way as to make significant comparisons. However, the BPR figures showed that maintenance (including repair) was the greatest time waster in the Group B jobs. For no other class of equipment do these delays loom so large. Though it is true that most of these Group B jobs were in "hard digging", this class of material did not account for the delays, which were traceable rather to poor job management. Blasting, in fact, is a help in classification of material, and further tests showed that the handling of large rocks was not an important factor in the breakdown of power-shovel equipment. Next to maintenance and repair, insufficiency of hauling units wasted a lot of time in the power-shovel operations under consideration by the BPR. While an increase in the number of hauling units might be expected to take care of this problem, that is not the whole story. As the number of hauling units increases, their own lost time begins to mount while they wait to be loaded at the shovel site. The problem here is the economic one of determining the amount that will result in the lowest unit cost under any given conditions.

Total power-shovel delays as between Groups A and B (no adjustment being made for the class of material) were: Group A—29 per cent of available working time; Group B—62 per cent.

Crawler Tractor-Drawn Scrapers

On the whole, the fewest delays were attributable to crawler tractor-drawn scrapers, chiefly due to the fact that this class of equipment has a minimum of dependency on auxiliary equipment. Maintenance and repair, again, accounted for the greatest proportion of the difference in time losses for Groups A and B. Another delay (though a small one) came from waiting for the pusher. Crawler scrapers, however, can, when necessary, self-load fairly satisfactorily.

Delays on Group A and B jobs using crawler scrapers totaled: Group A—12 per cent of available working time; Group B—39 per cent.

Rubber-Tired Scrapers

The last of the five classes of equipment considered was that of rubber-tired tractor-drawn scrapers. Once more, maintenance and repair proved to be the greatest time wasters, according to the BPR statistics. The percentage was about the same as for crawler scrapers. The rubber-tired tractor units are, however, dependent upon pushers to a greater extent, and a pusher (or puller) is a must in most cases.

Total time losses for rubber-tired tractor-drawn scrapers were: Group A—23 per cent of available working time: Group B—53 per cent.

Conclusions

Mr. Farrell sums up his findings by concluding that the largest single source of delay (other than weather) common to all classes of equipment involves the repair and maintenance of the equipment itself. Approximately 30 per cent of all delays is attributable to this cause. While ac-

quisition of new equipment is an excellent insurance of dependable mechanical performance, new equipment by itself will not do the trick. Good job management is the answer.

The problem of keeping equipment in satisfactory repair is a critical one, so capable and conscientious operators are essential for all contractors. Dependable men, however, are in short supply both for operating the equipment and for servicing and repairing it. Highway contractors, therefore, are placing a higher premium on the long-term ruggedness, durability, and "built-in-maintenance" features of heavy equipment rather than on its initial cost or apparent performance characteristics.

Such other considerations as supply of materials and adequate numbers of hauling units and pushers must not be forgotten when planning the management of a highway job. There is room for improvement, Mr. Farrell concludes, if uneconomical time losses are to be avoided.

Le Tourneau Promotes Powers

R. G. LeTourneau, Peoria, Ill., has recently announced the promotion of Harry R. Powers to the post of Domestic Sales Manager. Mr. Powers has been in the construction equipment field for the past 30 years, and for 5 years prior to his present appointment served as Eastern Area Sales Manager.

New Welding Helmet

A new fiber-glass welding helmet is manufactured by the United States Safety Service Co., 1215 McGee St., Kansas City, Mo. The Saf-I-Weld helmet is strong and durable, but light in weight, the manufacturer points out.

A position hinge locks the helmet in a raised or working position and is adjustable to fit any head size. The one-piece seamless shell is said to be resistant to warping from heat or moisture and to meet the ASA code for electrical conductivity and strength. The helmet is available in light green.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 630.

Levels of Great Lakes Lower This Year

According to the Corps of Engineers, U. S. Army, peak levels of the Great Lakes are expected to be lower this year than in 1952.

Estimated maximum high-level comparisons between 1953 and 1952 are: Lakes Michigan and Huron, almost 2½ inches lower; Lake Ontario, almost 11 inches lower; Lake Erie and St. Clair, slightly more than 1 inch lower. Lake Superior's level is still falling, and an estimate will be made later.

Last year a Congressional committee requested the Army Engineers to make a study of recent high levels of the Great Lakes, with a view to determining property damage due to changing lake levels. The Corps, estimating in its report that damages along the shores of the United States from the spring of 1951 to that of 1952 amounted to $61,000,000, recommended a comprehensive survey to determine the feasibility of a plan of regulation for Great Lakes levels, and possibly individual flood-control projects for certain areas.

Catalog on Dump Bodies

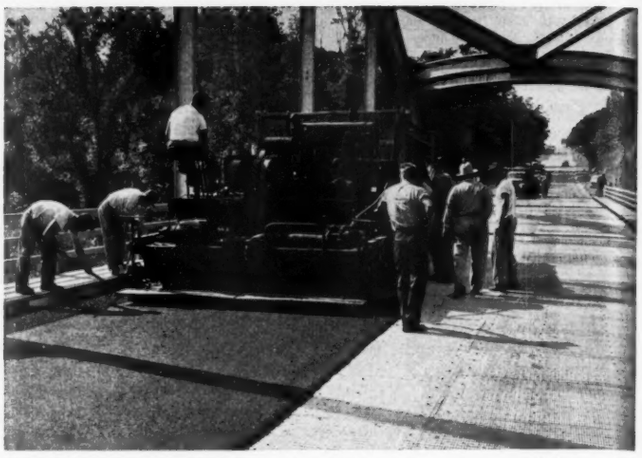
A new catalog describing its line of dump bodies, hydraulic hoists, and end-loaders is announced by the Galion Allsteel Body Co., Galion, Ohio.

A reference table helps the user to select the exact hoist and body best suited to his needs. Action photographs, engineering diagrams, technical information, and mechanical specifications are other catalog features.

To obtain this literature write to the company and ask for L-6512, or use the Request Card at page 18. Circle No. 559.

Le Roi Promotes Personnel

Several personnel promotions were recently made by Le Roi Co., Milwaukee, Wis. Henry C. Osterkamp, who has been in complete charge of design and development of Le Roi compressors for the past 20 years, is now Field Research and Division Engineer for the Construction & Mining Sales Division. Merrill Sedgwick, formerly in charge of the Michigan, Ohio, and western Pennsylvania district, has been appointed Manager of Tractair sales. He is succeeded by James B. Harwood, who joined Le Roi in 1950.



The bridge over the Rock River at Grand Detour, Ill., gets an anti-skid treatment. Left: annealed no-thread Nelson studs are welded onto the steel grid, then heavy diamond steel mesh is impaled over the studs and the studs bent over. Right: on top of the steel mesh goes a blacktop surface.

Blacktop Over Steel Mesh Reduces Skids

Steel-deck bridges can, under certain conditions, be a source of danger to motorists on account of skidding. During fall and winter such accidents are particularly apt to occur, because the vapor rising from the water below freezes on the smooth steel-grid decks.

The Illinois Division of Highways of the Department of Public Works and Buildings has thought up a practical way of overcoming this icing problem. The plan is to cover the grid with steel mesh, securing it by means of stud welding. Bituminous-concrete surfacing is then laid.

The first bridge to be treated this way was the 1,000-foot bridge over the Rock River at Grand Detour, Ill., 6 miles north of Dixon. In 9 working days this bridge was completely resurfaced, one-half being kept open to traffic all the time. Approximately 25,000 annealed no-thread ¼ x 1-inch studs were end-welded to the steel grid on 12-inch centers, using four Nelson stud-welding guns. Then heavy diamond steel mesh was impaled over the studs, and the latter were bent over to hold the mesh firmly in place. After this a rough coating of coarse I-11 blacktop was placed on the mesh. A finish coat completed the job.

Ball-Bearing Lubrication

A new bulletin that describes the lubrication of ball bearings is available from The Fafnir Bearing Co., New Britain, Conn. It explains the reasons for lubricating a ball bearing and factors to consider in choosing oil or grease. Drawings and text illustrate some of the ways in which particular lubricating problems may be solved.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 564.

Worthington for Madsen Iron

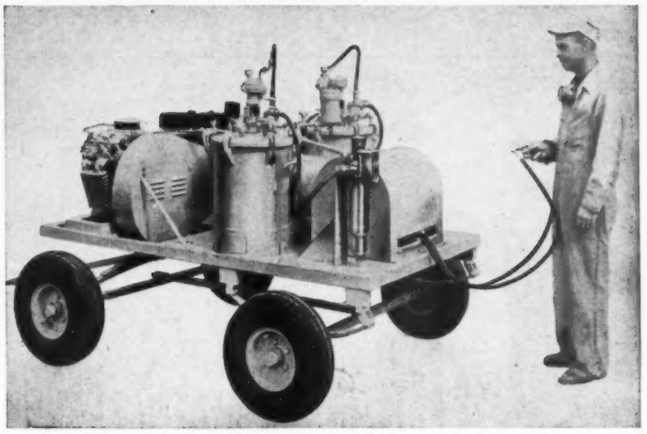
Glenn F. Worthington is the new Sales Manager of Madsen Iron Co., Huntington Park, Calif., producer of asphalt paving plants. Prior to 1945, when he joined Madsen, Mr. Worthington was associated with California Well Dehydrating Co. in west Texas.

Paint-Spraying Unit

A portable spray-painting outfit is available from the Universal Mfg. & Sales Co., 5211 Pacific Blvd., Huntington Park, Calif. The Model N4-432 has a 35-cfm compressor that can handle one to three spray guns simultaneously. The compressor is driven by an 8-hp air-cooled motor, complete with self-starter, battery, and generator. Two 10-gallon paint tanks are standard equipment, but two 20 or 30-gallon tanks can be installed without structural change. Paint may be drawn from the tanks singly or from both at once. Air and fluid are carried through 100-foot hoses wound on a reel. Other features are an automatic compressor unloader, air-motor-driven paint agitators, a compressed air dryer, and a built-in hose-line cleaner.

The unit is mounted on a 4-wheel pneumatic-tired trailer for towing behind truck or tractor.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 554.



The Model N4-432 handles one to three spray guns simultaneously.

Drafting Stencils

Stencils that serve as aids in drafting are available from John R. Cassel Co., 110 W. 42nd St., New York 36, N. Y. The stencils are made with a variety of standard specialized symbols as well as a wide range of common geometric shapes. Some examples are an isometric 2-angle and ellipse stencil, a house-plan template, a nut-and-bolt template, a radius guide, and a stencil of electrical symbols.

For further information write to the company, or use the Request Card at page 18. Circle No. 590.

Concrete-Cure Bulletin

A bulletin on a concrete curing agent has been issued by Reardon Industries, Inc., 2837 Stanton Ave., Cincinnati, Ohio. It tells how Sure-Cure forms a thin skin over the concrete to permit it to cure. By sealing in the moisture it is said to reduce dusting, crazing, shrinkage, and cracking.

This literature may be obtained from the company, or by using the Card that is bound in at page 18. Circle No. 667.

Pump and Adapter Described

A pump with supporting adapter is described in a new bulletin released by Allis-Chalmers Mfg. Co., Milwaukee, Wis. The pump is available in a choice of packing or mechanical seal, and in a choice of materials, according to the bulletin. To install it requires only four bolts plus electrical and pipe connections. No special foundation is needed.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 576.

KSM Promotes Maladra

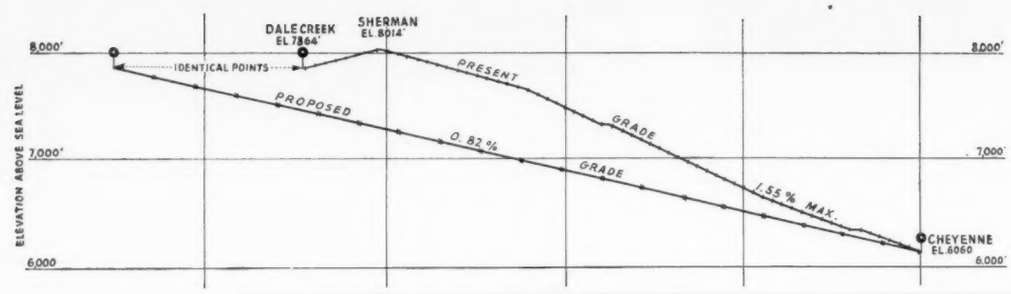
Anthony Maladra has been promoted Assistant Manager of KSM Products, Inc., Merchantville, N. J., producer of studs and equipment for electric-arc stud welding.

New Welding Machine

A new welding machine is manufactured by Complete Machinery & Equipment Co., Inc., 36-40 Eleventh St., Long Island City 6, New York. The unit has an American-Elin welder of 375-amp capacity which is direct-connected to an Oliver 166D diesel engine. The welder may be operated by a 220 to 440-volt power line. Pneumatic-tire mounting makes the unit suitable for field use.

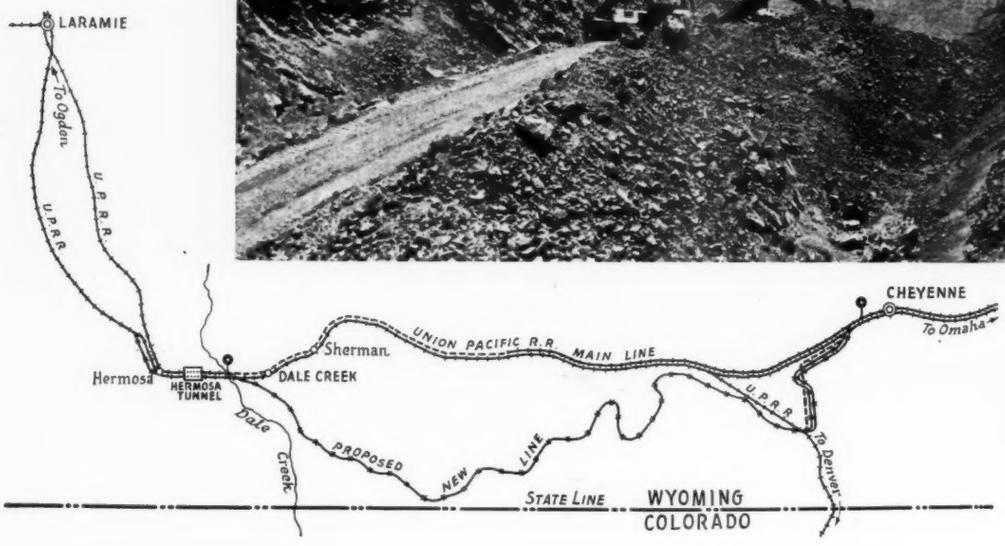
For further information write to the company, or use the Request Card at page 18. Circle No. 668.

This welding machine can be run on a diesel engine or an electric motor.

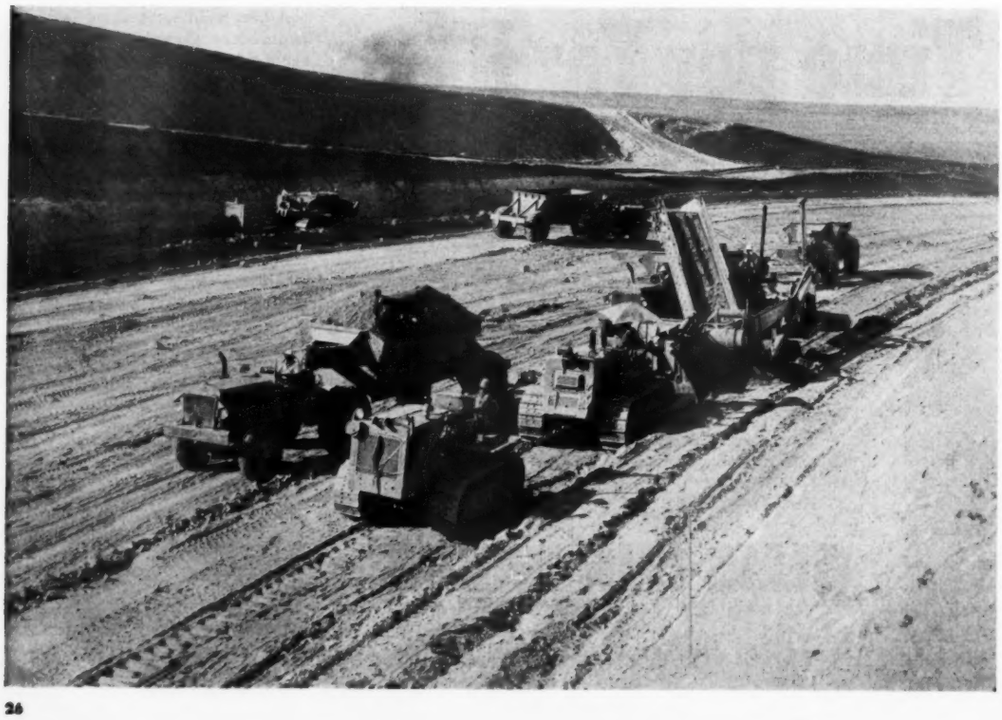


(*U. P. R. R. Photo*)

The profile (above) shows how grade reduction offsets additional mileage of the new westbound route (see plan below).



Moving mountains—5-yard shovel (above) and Euclid loader spread (below).



Railroad

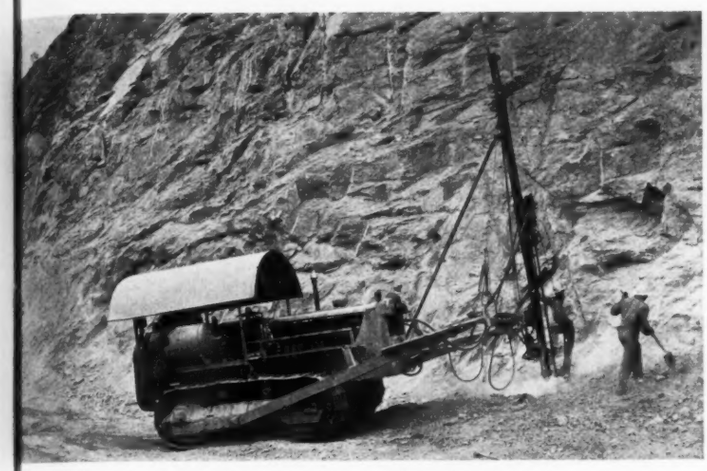
By RAY DAY

(*Photo on page 1*)

• IN eastern Wyoming, between Cheyenne and Dale Creek, Union Pacific Railroad has a 42-mile $16,000,000 line change nearing completion. The excavation, undertaken by Morrison-Knudsen Co., Inc., Boise, Idaho, was the biggest single job of this kind ever let in the state, and is the U. P.'s biggest construction project since the road was finished in 1869. Morrison-Knudsen assigned an enormous equipment fleet in 8 separate spreads to the work, and moved grade and fill at an average monthly rate of 1,000,000 cubic yards to hurry the project to completion.

Union Pacific officials decided to make the line change when passenger and freight volumes of 1951 justified the cost of the project. The 42-mile line change, which will handle westbound traffic out of Cheyenne, will reduce maximum grades from 1.55 per cent to the controlling grade of 0.82 per cent compensated. Although the new

A battery of wagon drills hammers away at a tough rock section. Holes were drilled about 24 feet deep and on 5-foot centers.



This unique mounting of a Worthington wagon drill and Gardner-Denver compressor on a Caterpillar D8 tractor was used for drilling in difficult locations.

d Cuts New Line

route will be 9 miles longer than the existing line, the running time of trains will be cut by as much as 15 minutes because of the grade reduction. In addition, lowered fuel consumption and better operational efficiency are expected from the change. The new line will be a single-track affair over all but 6 miles of its length, because the existing line will continue to handle eastbound movement.

Project Background and Design

The new line change is rich with historical background, and when future trains puff up the easier south mountain grades in the future, their passengers will see the same magnificent park-like country which Jim Bridger, Captain Howard Stansbury, General Grenville M. Dodge, and other Army and Union Pacific pioneers first charted. The new line change passes through the same part of the Laramie Mountains where General Dodge and his soldiers retreated in 1865 from a warring Indian band. Passengers on the new route will see some of Wyoming's most beautiful country.

By contrast, the existing railroad line to the north makes a sharp climb to the 8,014-foot summit of Sherman Hill. At the time it was built, earth-moving machines had not been developed, so the steep climb was preferable to what would then have been an impossible excavation project.

Started February 18, 1952, all major grading was finished early in 1953. Union Pacific crews are busy laying track and ballast on the 20-foot roadbed, and by next August officials expect to see the first trains roll over the new line.

Most of the 25 miles at the east end of the new line was graded through common gravel and clay, and much of the remainder was cut through decomposed granite and solid rock.

In general, the fills were built with 1½ to 1 slopes, and the cuts had 1 to 1 slopes, except where slight deviations were required to suit special soil conditions. There were no unusual provisions in the grading specifications for compaction of fills, since the heavy equipment

(*Continued on next page*)

Strung-Out Job Demands

Service Shop for Each Equipment Spread

• PREVENTIVE maintenance on a monstrous equipment fleet strung out over a 42-mile railroad-relocation job for the Union Pacific Railroad called for a decentralized organization unusual even for Morrison-Knudsen Co., Inc., contractors on the whopping big 7,000,000 cubic yard excavation job. With terrain so rugged, a decentralized setup had to be made for each of the eight equipment spreads. It operated so efficiently that never at any time was the exact status of any piece of equipment under question. And usually the equipment was working.

The M-K Service Policy

The preventive-maintenance policy of Morrison-Knudsen Co. is uniform over all its jobs, and is intended to get the most usable working life out of each unit of machinery. This policy was redefined a little while ago by President Harry W. Morrison, who wrote:

"Second only to qualified men, good construction equipment is the fundamental factor in M-K's production. Nothing can be more important than to maintain it in the best possible mechanical condition. Having perhaps the largest stock of machinery for any heavy-construction contractor, we presumably enjoy an advantage as long as those rigs are operating at normal mechanical efficiency, with a minimum of down time. Any machine not so operated is, to the extent of its failure, a liability.

"To minimize that liability we invest millions annually in replacing older machines with new. To maintain them we have established central shops by M-K districts, with

(*Continued on page 32*)

A big Manitowoc 4500 diesel shovel swings 5 yards of rock over a Euclid end-dump. It is one of two on the job turning out 300 cubic yards per hour. *U. P. R. R. Photo*

Union Pacific RR Constructs New Line

(Continued from preceding page)

moving over the material assured its consolidation. As the moisture content of the material also is near optimum generally, no additional moisture was needed. No special steps have been taken to protect side slopes from erosion, because the heavy rock, clay, and clay-sand formations on the slopes are not particularly vulnerable to erosion. The area has a relatively light average rainfall and little snow.

One of the biggest fills in the job is a 112-foot barrier across the deep valley of Sand Creek. The biggest fill, 164 feet high, is located at Texas Creek. It is 546 feet wide at its base, and contains 775,000 cubic yards of material. Beneath this and the Sand Creek fills, Armco metal culverts of 60-inch pipe, encased in concrete, have been installed. The deepest cut is about 1½ miles from the west end of the project. It is 154 feet deep, requiring the excavation of 300,000 cubic yards of solid rock.

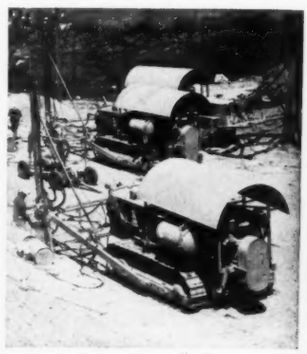
In a deep cut, a Caterpillar scraper pulled by a DW20 is push-loaded by a D8 to pick up its heaped load of material.

There are to be no new bridges along the new route, because all waterway openings and underpasses will be in the form of culverts. There will be 23 Armco Multi-Plate pipe culverts of 180-inch diameter and two of 150-inch diameter, along with many 72-inch Multi-Plate and 60-inch ready-made corrugated metal pipes. Where county roads pass through the culverts, the bottoms of the openings are covered with gravel and a 4-inch asphaltic pavement, placed on top of the gravel.

In addition to M-K's grading item, the job also included construction of a new station called Harriman, 32 miles west of Cheyenne, and 9 miles of water pipeline. When the new route is in use, the Harriman station will have a coal chute, water tank, two complete section crew layouts, and a coal chute office.

Grading Organization, Equipment

With typical M-K emphasis on thorough organization and good equipment, the earthwork portion of the job was arranged in eight separate spreads, each under the supervision of a superintendent and each responsible for certain balanced portions of the project. Generally speaking, the spreads consisted of tractor-scraper equipment, faster rubber-tired units, Euclid loader and truck units, and heavy power-shovel and truck units. Details of the equipment assigned to each of the eight spreads are given in the companion article to this.



Another view of the unusual D8 mounting of a Worthington wagon drill and a Gardner-Denver compressor.

Each equipment spread was a complete entity, with its own small shop and mechanics. Efforts of the various spreads were coordinated by Project Manager Robert Denham and his assistant, R. J. Jones, who assigned progressive work to the various spreads. When a spread finished up the work around one balance point, it moved ahead to the

next assignment adaptable to that equipment.

Some idea of the enormous investment in construction equipment on the job can be gained from a recent tabulation made by Union Pacific officials, as follows:

- 2 Manitowoc 5-yard rock shovels
- 4 Northwest 2½-yard 80-D rock shovels
- 1 Euclid loader
- 23 Euclid 17-yard end-dump trucks
- 12 Euclid 13-yard bottom-dump trucks
- 5 Wooldridge 15-yard Terra Cobras
- 8 Motor graders: 6 Caterpillars, 1 Allis-Chalmers, 1 Adams
- 2 Winter-Weiss Portadrills
- 3 Caterpillar DW20's
- 32 Caterpillar tractors, and
- 1 International TD-24 tractor, all with accessory equipment for dozers, rippers, and 17-yard scrapers
- 6 Caterpillar tractors equipped with Worthington wagon drills and Gardner-Denver compressors
- 2 Truck cranes
- 12 Air compressors
- 1 Bucyrus-Erie Hydrocrane, for assembling culverts and laying pipe

In addition to the above equipment list, a 5,000-gallon diesel fuel tank was maintained at each spread, supplied by tank truck from Cheyenne. Also included along with the above equipment list were many trucks, pickups, flatracks, grease trucks, welders, wagon drills, jackhammers, and light plants. Buses are even assigned to the project, to carry transport men to and from work. In spite of the relative inaccessibility of the job to nearby towns, this type of transportation permits the crew to live away from the job, so no camps are necessary.

Highball Excavation Job

Although the project schedule called for a general average of 1,000,000 cubic yards a month, the assignment of so much good equipment and so many competent men resulted in yardages often in excess of that figure. In July, 1952, for example, the outfit flexed its muscles and moved 1,200,000 cubic yards. Such big yardage figures reflect the use of equipment at peak capacity.

Generally speaking, any questionable digging material ahead of the scrapers, DW20's, and Terra Cobras was ripped before the machines attempted to load. Most of the hauling units were built up to hold several more cubic yards above the rated capacities of the machines, and plenty of pusher power was used in the pits to make sure the machines would leave with heaped loads.

A Euclid end-dumps rock and muck off the edge of one of the high railroad embankments.

On the drilling and blasting end, M-K developed a method of mounting a small Gardner-Denver compressor on the rear end of a D8 tractor, driving the compressor off the tractor's engine driveshaft. On the front end of the tractor a Worthington wagon drill was mounted, which took its power from this compressor. The resulting machine was mobile, had ample travel and air power, and went easily into the inaccessible spots and sank about 800 linear feet of hole a day. In addition to the 6 tractors so equipped, there were numerous Ingersoll-Rand and Gardner-Denver wagon drills on conventional mountings, as well as a pair of Winter-Weiss new Portadrills, which use Hughes oil-type drill bits.

Drill lifts were usually 24 feet deep, and the harder formations required 5-foot drill centers with

(Continued on next page)

RR Builds New Line

(Continued from preceding page)

column loading. Timken tungsten carbide drill bits were used in the harder formations, with sharpening grinders on the job to reface the cutting edges when they dulled. Hercules and Du Pont 40 per cent powder and Atlas powder was used for the breakup job, pulling the shots from a 220-volt portable light plant.

The Euclid loader spread was operated often in gravelly material, but the loader had such digging capacity that it kept its hauling units working at top speed nonetheless. This rig was pulled by the International TD-24, assisted by a D8 Caterpillar.

A feature of interest to dirt stiffs is the good operating care which many of the better drivers are using on their vehicles. The M-K job involves big yardage, and much of the hauling equipment consisted of large powerful units equipped with Allison torque converters, designed to reduce shock and give a smoother application of engine power to the driving wheels. It requires an unusually intelligent high-type operator to drive such a vehicle to its best advantage, and some of the rules these men follow on the torque-converter-equipped Euclids, for example, have a direct bearing on lowered maintenance and higher effective working time.

On any M-K job, when an operator prepares to start one of these big rigs at the beginning of a shift, he personally checks the engine lubricating oil in both engines, and if the level is low, he brings it up by contacting the shift boss or the service truck. He checks his radiator cooling solution, and takes a look at the tires to make sure they are not low or flat, or that they have no rocks stuck between the duals, before he takes off. Although M-K's routine service mechanics are of the best, these little operator precautions before starting help to make the service program better.

Assistant Project Manager R. J. Jones holds an early morning conference with Manager Robert Denham.

To start one of the rigs, an operator shifts his transmission in neutral and depresses the accelerator pedal. By pushing corresponding starter buttons, both engines are started. The good operators never operate a cranking motor for more than 20 seconds at a time, and if the engine doesn't start promptly they allow the cranking motor to cool for about 2 minutes before using it again. Converter-equipped trucks are always push-started in a forward direction under supervision of the shifter or head mechanic, and push starts are held to an absolute minimum. After the engines start, they are allowed to warm up at part throttle for 3 to 4 minutes before they start to work. Fanning an accelerator during the warmup process is frowned upon on an M-K spread; it marks a man an amateur.

In driving these big vehicles, the good operators always start the truck in first gear whether it is empty or loaded. At 5 mph, the truck is upshifted to second gear, and at 10 mph the upshift to third gear is made. Jerking on the upshift with a wide-open throttle is eliminated by easing up on the throttle momentarily when the shift is made. Down shifting is made to lower ranges at the same comparative truck speeds, and in hard-going material or on a grade the downshift is made at wide-open throttle. Every operator has been cautioned that down shifting at excessive speed can result in serious damage, and no shifts to reverse are ever made unless the truck has been brought to a complete stop.

The air brakes on these units are very important, because hauls are often long and the grades are sometimes steep. Operators make sure the air-pressure gage is up around 60 pounds before they start off at the beginning of a shift. They drain

Two Wooldridge Terra Cobras in Spread No. 4 take a cut down to grade.

their tanks at the end of the day, and avoid fanning the air brakes while driving.

The good operators also make certain the power-takeoff lever is in the float position while they drive, and instead of using the raised-body tail section of the truck for a bulldozer, they use dump men and spotters to guide them to a safe end-dump. They never drive on rough or wavy ground with the truck body raised, because it places extreme stresses on the hoist cylinders and mountings.

Good truck-driving habits include an approach to the dumping area at a rate of speed lower than the maximum, with a downshift to second gear at 10 mph before making the turn at the dump. This eliminates stresses to the tires and tandem axles on some of the Euclids.

All gages are periodically inspected by the operators, and often an improper gage reading, reported to a supervisor, saves down time later on. One of the surest ways to be discharged is for an M-K operator to ram his truck into a bank to stop, or turn the front wheels easily. It goes without saying that such practice places destructive stresses on the steering and front-end assembly. Operators string out their time at the mobile service unit so they can drive the spare "Euc" while theirs is being serviced. Trucks are not left with their transmissions engaged; rather, they are parked in neutral and adequately blocked if they are to be left for any length of time. Safe distances are maintained between loaded trucks on the haul roads. If possible on weekends, trucks are parked side by side, well blocked, with 50-foot intervals between the machines so mechanics and service men can get to the various units more easily.

The trucked fills on the U. P. Railroad job were made by the end-dump method, with a dumpman or spotter controlling the point of dump. A dozer at each end-dump kept the material pushed off level, kept the big machines away from the edge, and assured a smooth fill for the equipment.

In general, the job was pushed from the Cheyenne end, leapfrogging the various equipment spreads ahead as they completed the many subsections. A service road, built for the convenience of M-K's construction crews, is now used for pickups and other such vehicles operated by the railroad section men.

Not since the Golden Spike was driven at Promontory, Utah, in 1869, marking the completion of a transcontinental railroad, has Union Pacific done such a piece of construction as this. So important a piece of engineering is the big job that John Bunjer, assistant to U. P.'s Chief Engineer W. C. Perkins, was assigned to supervise field work for the railroad. The job proved to be a smooth running, high-capacity example of big-scale earth-moving made possible by modern equipment. What was still a virgin wilderness and rangeland a year and a half ago will soon be a common sight to passengers who travel west toward Ogden on the Union Pacific's main line out of Cheyenne.

Construction Boots

Engineers' boots are offered by the Red Wing Shoe Co., Red Wing, Minn. They feature spring steel shank with oak-leather or composition soles and logger or regular heels. The shoes have chrome-leather uppers.

For further information write to the company, or use the Request Card at page 18. Circle No. 697.

Service Shops for Equipment Spreads

(Continued from page 27)

field shops on projects generally manned and equipped for thorough servicing while in production and, also, so that machines no longer in use may be shipped, fully conditioned, to the next job as needed. Traveling master mechanics generally are made responsible for these shipments and for checking the mechanical condition of all units when shipped and delivered.

"It would be hard to overestimate the value and importance of keeping our huge fleet of equipment workwise—for an idle machine is not only an idle investment, but it is delaying the job. The management is justly proud of its mechanics, many of them tireless and loyal M-K veterans, who keep our rigs—their rigs—up on their wheels and tracks, turning out production.

"Let us keep checked up to be sure we are backing up these men to protect this basic investment on which our business depends."

This policy was followed in letter and spirit on the big job between Cheyenne and Dale Creek, Wyo., by giving each piece of equipment the care, preventive maintenance, fuel, service, repair, and lubrication recommended by its manufacturer. Anyone who has ever worked a big equipment fleet knows that this is always easier said than done.

Separate Organizations Needed

The 42-mile job, which passes through high rough range country, was impossible to control mechanically from a single headquarters. Project Manager Robert E. Denham and his assistant, R. J. Jones, decided between themselves that they could give the equipment its best care by setting up with each excavation spread a separate maintenance organization, much the same as if eight separate contracts were under way.

Service Engineer J. W. Lacey (left), Oxweld Railroad Service Co., pays a visit on the job to John Bunjer, assistant to Union Pacific's Chief Engineer.

At each of the spreads there would be a small 10 x 20 Armco tin shop building, mounted on 8-inch pipe skids, which could be towed along to the next location as the spread moved. There was also planned for each spread a 3,000-gallon diesel-fuel tank, a 300-gallon gasoline tank, the necessary welding machines, small tools and highly expendable parts like oil filters, brake bands, and so on. Chief Oil Co. of Cheyenne was given an order to deliver oil, grease, and tires.

At Lone Tree, near the predicted center of the first four equipment spreads, a 50 x 100-foot tin shop building was set up as a headquarters or suboffice for these spreads. Actually, it turned out to be more of a repair refuge from the endless high winds which blow through this high country, and all

major repairs calling for disassembly under clean conditions were made at this shop. A supply of normally needed spare parts was stocked at this shop, and Jim Barta, an M-K veteran master mechanic, was put in charge.

With this basic background, and with the understanding that all mechanical repair on the job would further be under the general supervision of M-K's Boise Master Mechanic, G. L. Karcher, the job was subdivided into eight spreads:

Spread No. 1: This was classed as a cat and scraper layout, responsible for about 960,000 cubic yards of material at an estimated production rate of 300 cubic yards an hour. The equipment maintenance for this spread was under Jim Barta and Kensel Shotwell, superintendent of the spread. Maintenance men included one mechanic and one welder on each of the two shifts, with a total of three grease monkeys. The grease men took care of all equipment in this spread by coming out to work when the morning shift was half over, and working through half of the next to make their 8 hours.

Equipment in Spread No. 1 included 8 Wooldridge 14-yard scrapers with D8's in front; a pair of D8 Caterpillar push cats; a D8 with a Wooldridge ripper; a Hobart welding machine; and a No. 12 Caterpillar motor grader for finish work.

In addition to the routine care of this equipment according to manufacturer recommendations, several little things were noted which applied to the cat and scraper spreads. The presence of very hard granite boulders in otherwise easy-digging material was very tough on cutting edges, and in decomposed granite particularly the wearing edges along the scraper bowls abraded badly. Wooldridge later corrected this condition at the factory by the installation of special heavy long-wearing plates. Spares for these plates were kept on hand in the field and were hard-faced with Stoody self-hardening 21 and with some welding rod furnished through an M-K allied manufacturing corporation. When the scrapers needed new side plates, they could be quickly installed.

Special care was given to the track rollers on the push cats. In general, the cats gave a minimum of trouble and the few repair parts which were needed were available at Cheyenne through Wortham Machinery Co., the Caterpillar distributor there.

Spread No. 2: Another cat and scraper layout, under the supervision of Clint Taylor, and figured for 862,880 cubic yards. In all other respects it was identical with Spread No. 1. Problems of mechanical upkeep were the same.

Spread No. 3: This spread was a Caterpillar DW20 layout, originally planned for DW10's. The DW20's moved about 600,000 cubic yards or a little over. They operated under the supervision of Jim Barta and Superintendent Russ Healey.

The spread consisted of 3 DW20's built up to 18-cubic-yard capacity; 2 D8 push cats; a D8 and a Wooldridge ripper; a No. 12 Caterpillar motor grader; and the usual mobile shop, welder, small tools, and oil and gas tanks. The problem of cutting-edge maintenance on the scraper spreads extended to the DW20's too, and the same preventive-maintenance welding was employed on them.

The driver tires on the DW20's naturally had to take more wear and abrasion than those on the hauling scraper, so they were carefully watched and at the proper time the scraper tires and driving tires were interchanged. This helped to equalize wear and prevent damage when the driver tires became worn just so far.

The diesel engines in the DW20's also required a special high-detergent lubricating oil, and Mobiloil's Series S-2 oil was used in these engines. Lubricating oil was changed every 120 hours.

Spread No. 4: Another fast rubber-tired fleet consisting of Wooldridge Terra Cobras, which moved 700,000 cubic yards at the rate of 400 cubic yards per hour. It, too, was under the supervision of Jim Barta, with William Perkins in charge of the spread.

The spread consisted of 5 Wooldridge Terra Cobras, with 2 D8 push cats; a Wooldridge ripper with a D8 pulling; a No. 12 motor grader; and the usual equipment shed and miscellaneous maintenance equipment. A driving-tire switch was necessary on the Cobras, but aside from this and some hard facing on cutting edges and sides of the scrapers, there was little trouble.

Spread No. 5: This spread was built around a huge Euclid BV-type loader with Euclid hauling units. Scheduled to move 900,000 cubic yards of muck at the rate of 450 cubic yards an hour, this spread really had to roll. With some of the latest models of Euclid equipment, and intricate mechanical setups, a master mechanic—Johny Williamson—was employed on this spread. He used two mechanics, a welder, and two grease men on each shift to keep this spread operative. Clark Johnson was Superintendent of the spread.

The spread consisted of the BV-type Euclid loader, pulled by an International TD-24 and a D8 Cat. There were 12 Euclid bottom-dump hauling units of 13-yard capacity to

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Service Shops

(Continued from preceding page)

move the muck away from the conveyor belt. There were three D8's used as dozers to smooth up the material, and this spread also had a No. 12 motor grader, a mobile shed, lubrication equipment, etc.

One of the best tricks in servicing "Eucs" is to have a spare handy so the operator can keep hauling while his equipment is being serviced. In spite of the brutal use the Euclids got on this job, they demanded nothing except routine service and filter changes recommended by their manufacturer.

Spreads 6 and 7: These were identical shovel layouts for moving out blasted rock and other hard digging behind a drill fleet. Spread No. 6, with Johnny Johnson as Master Mechanic and Bill Anderson as Superintendent, moved 975,600 cubic yards at 300 cubic yards an hour. Spread No. 7, under Master Mechanic Bill Miller and Superintendent Joe Haines, handled 919,700 cubic yards at the same rate.

The equipment in each spread was basically the same: a Manitowoc 4500 5-yard shovel; a Northwest 80-D; eight 15-yard end-dump Euclids; 3 D8 dozers; four 500-cfm Ingersoll-Rand and Gardner-Denver compressors; 6 Ingersoll - Rand wagon drills; and 2 special D8-mounted Worthington wagon drills, with Gardner-Denver compressors mounted on the D8's stern. The latter specialty is usually a job for the mechanics, but worked well here. Details of the mounting and performance are given in the companion article (page 26).

The principal maintenance on these shovel spreads emphasized hard surfacing with Stoody 21 on dipper lips and teeth, proper lubrication, and level digging positions for the big Manitowocs. The end-dump Euclids gave little trouble if they were properly operated and cared for. Several operators were chased off for "cowboy" driving, and operators are hard to get in Wyoming. The loosening up of differentials was prevented by paying special attention to the lubricant levels at this point. Euclid differentials need the recommended lubrication, or they will loosen up.

Many of the big "Eucs" were the new 36-TD's, and transmission maintenance was cut to a minimum because they were equipped with Allison torque converters which made it possible for the operators to shift at full speed under practically any condition without jerking the whole transmission. In spite of sharp grades in many of the areas, the end-dump Euclids took some of the worst punishment on the job—loading under 5-yard shovels—and stood up well.

However, the newer "Eucs", their engines, and the engines in the Manitowoc shovels are all intricate modern pieces of machinery, designed to deliver a powerful punch even at this high altitude. They simply cannot be operated and forgotten. Factory-recommended maintenance is what they need, and that's what they got on this job. It took more mechanics and grease monkeys on the shovel spreads than it did, for example, on a scraper layout to give this kind of service.

Spread No. 8: This one consisted of a pair of Northwest 80-D's which moved 751,680 cubic yards at the rate of 300 cubic yards an hour. LeRoy Byers was the master mechanic on this spread, with Grant Peacock as Superintendent. The spread had, in addition to the two 80-D's, a Euclid 36-TD; 5 Euclid 20-TD's; three 500-cfm Ingersoll-Rand compressors; 3 Gardner-Denver 500-cfm compressors; 7 wagon drills; a Winter-Weiss Portadrill; and 2 D8 tractors with dozer blades.

The same type of maintenance used on the other spreads was followed, using the manufacturer's guide books. Spread No. 8 had a total of 7 mechanics, 5 grease men, and 3 welders to keep the equipment operating. All drill-bit sharpening, incidentally, was done away from the spreads.

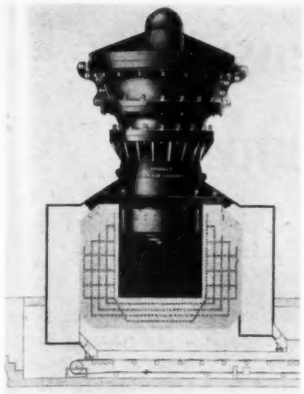
In addition to the 8 spreads, there was about $200,000 worth of pipe and culvert work. Superintendent Dean Rule, in charge of this part of the work, bummed mechanics and maintenance men for his equipment as needed. The same thing was true of a few pieces of equipment setting up a housing center, coal chute, and water tanks under Superintendent S. A. Barker. A 9-mile pipeline, under the supervision of Harold Gourlie, was subcontracted, so maintenance there was done by the subcontractor.

Individual Equipment Records

Every piece of equipment on the job had its own record card at the Cheyenne office, and these cards were maintained up-to-date by a man especially trained in the clerical end of equipment maintenance. As parts were requisitioned and sent out to the various spreads, their cost was charged out. Daily mechanic's work reports were posted to give a running record of service for each unit. M-K management could see at a glance the historical service record on all of the company's equipment, and know its maintenance and operating cost.

And the biggest part of the whole maintenance program, if it could be pinned down to one thing, was the hardboiled adherence to a systematic routine which followed the recommendations of the various manufacturers. According to every mechanic interviewed for this article, there is no better guide.

The result is plain for any visitor to see. M-K's many spreads do not have yards full of idle, broken-down equipment. The machines are new-looking, in excellent condition, and as President H. W. Morrison emphasized recently, they are in the pits working on capacity production, where they will be an asset to the company instead of a liability.



New Gyratory Crusher

A new development in gyratory crusher construction, said to handle rock and ore without clogging of the discharge vents, is announced by the Kennedy-Van Saun Mfg. & Engg. Corp., 2 Park Ave., New York, N. Y. It has two discharge outlets built at a 70-degree angle. A vertical 6-foot drop separates clay from rock and ore, which pass through the mantle and concaves at the bottom.

The crusher is gearless with synchronous motor built into pulley assembly. All moving parts are on self-aligning roller bearings. It has a recirculating forced-feed oiling system with automatic power shut-off in the event of oil-pressure failure.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 574.

Data on Wheelbarrow Line

A line of wheelbarrows is shown in a catalog by the Champion Wheelbarrow Co., P. O. Box 138, Byron Center, Mich. Specifications are given for pneumatic-tired and steel-wheeled barrows of heaped capacity ranging from 3 to 5 cubic feet. Trays come in baked-enamel finish.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 658.

Highway-Guardrail Folder

An illustrated folder on highway guardrail has been issued by Armco Drainage & Metal Products, Inc., Middletown, Ohio. It describes how Flex-Beam corrugated-steel guardrail makes for safety. The folder contains a variety of pictures of different types of installation.

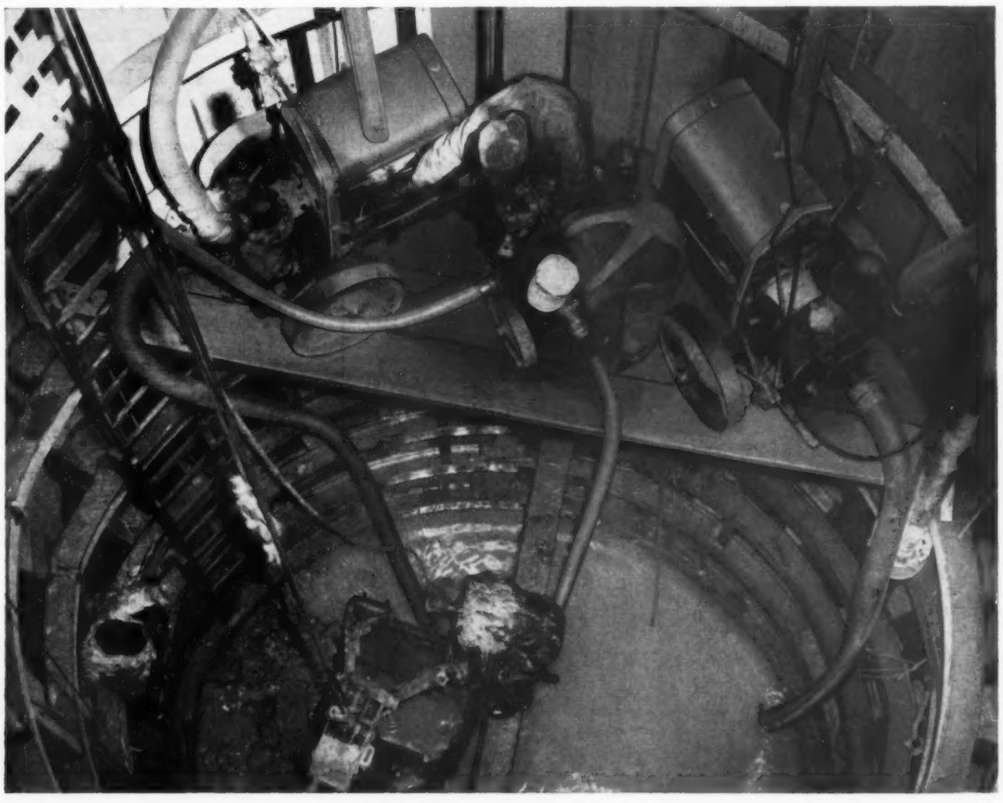
To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 600.

Hyatt Promotes Webster

F. H. Webster succeeds C. L. Newby as Manager of the Western Division sales office in Chicago of Hyatt Bearing Division, General Motors Corp., Harrison, N. J. He was formerly Assistant Manager under Mr. Newby, who has retired after 34 years' service.

An American 40-ton crawler crane unloads a 22-ton section of concrete pipe for an aqueduct. United Concrete Pipe Corp., Monrovia, Calif., was the contractor.

Looking down caisson during construction of $1,400,000 Buffalo, N.Y. High Level Bridge
Two Jaeger 6" pumps and one Jaeger 2" pump handle heavy inflow into 17 ft. diameter caisson, going to 50 ft. depth in riverbed. 25 of these caissons were used to support concrete piers, several up to 95 feet high, at river's edge. Additional caissons were sunk near an elevated railway and an auditorium, to protect their foundations. In many cases cement grouting was necessary — on a single caisson as many as 800 sacks of cement were used.



Concrete Extensions For Airport Runway

S. J. Groves & Sons Co. Does Fast Job in Kansas City, Kans., Laying 8-Inch Plain Concrete at Fairfax Airport

By William H. Quirk, Editor

• WORKING with smooth efficiency and no lost motion, the S. J. Groves & Sons Co. of Minneapolis, Minn., has just completed extensions to a runway and taxiway at Fairfax Airport, Kansas City, Kans. The job included lengthening the north-south runway 1,200 feet at the south end, extending it from 4,800 to 6,000 feet; and adding 1,600 feet to the servicing taxiway west of the runway. A hard stand area, 400 x 200 feet, was also built joining the runway and taxiway extensions at their southern extremities. All pavement is 8-inch plain concrete.

The $400,000 project, consisting of the necessary grading, drainage, and underground facilities as well as paving, got under way November 17, 1952, and was completed within 2½ calendar months. S. J. Groves did the work for General Motors Corp., which is building jet planes for the U. S. Air Force and needed the extra length on the runway for its tests.

Fairfax Airport is used for both military and civilian purposes, and has three other runways besides the one just extended. They are: a northwest-southeast runway 6,500 feet long; a northeast-southwest runway, 5,800 feet long; and an east-west 4,500-foot runway. The airport is located at the easternmost tip of Kansas along the right bank of the Missouri River as it makes a great bend to the south. A few miles downstream on the opposite side of the river is the Municipal Airport of Kansas City, Mo.

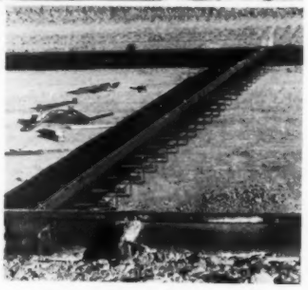
Grading and Drainage

While the terrain at the airport is fairly flat, approximately 30,000 cubic yards of earthwork was included in the contract to bring the extensions to grade. Of this yardage about 70 per cent was cut and fill at the site, the remaining 30 per cent consisting of borrow. The latter was obtained from a pit 1½ miles from the airport. All material, both excavation and borrow, was primarily river silt which was easy to handle and compacted well. No rock or hardpan was encountered.

For grading at the field the contractor used three Caterpillar DW10 rubber-tired tractors with Caterpillar scrapers, and two Allis-Chalmers HD-20 crawler tractors with LaPlant-Choate scrapers. An HD-20 push tractor helped in loading the scrapers. Both tamping and rubber-tired rollers compacted the fills to 95 per cent modified Proctor density. A D7 and a Case tractor pulled the rollers. A pair of Caterpillar No. 12 motor graders handled the final shaping and leveling.

At the borrow pit a Northwest dragline loaded the material into a fleet of 17 hired trucks that hauled it to the job site.

A total of 5,400 linear feet of Armco bituminous-coated corrugated metal pipe, ranging in size from 12 to 54 inches, was laid to drain the extended portion of the airfield. Trenches were dug with 2 Northwest No. 6 backhoes, and a Barber-Greene and a Cleveland



A Koehring 34-E Twinbatch paver (above) drops a bucket of concrete in front of a Jaeger-Lakewood finishing machine. At right, a Kapco transverse expansion joint across a 25-foot lane.

trencher. Most of the pipe was laid with an International TD-18 tractor equipped with a front-end boom.

Paving Preparations

The 150-foot-wide runway and the 75-foot taxiway extensions were paved in 25-foot lanes. There is a 5-foot concrete gutter along each edge of the runway to catch the storm water and prevent erosion at the edge of the pavement. Paving totaled 42,000 square yards.

Heltzel forms, totaling 4,500 linear feet, were set and pinned by hand on the prepared subgrade. A Cleveland Trailgrader, pulled by a D6 tractor, made a last adjustment on the grade, scraping off the high spots and filling in the low. Then a Huber 10-ton tandem roller gave it a final compacting.

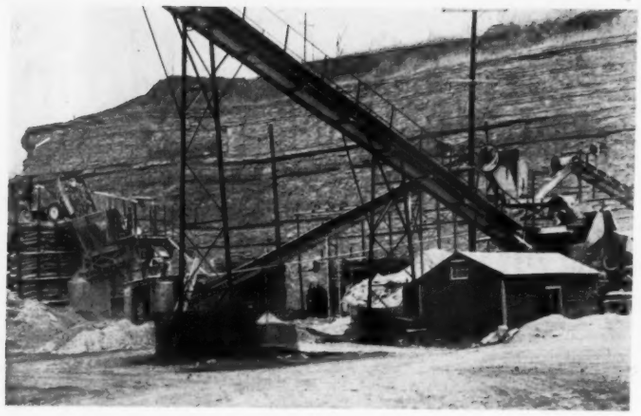
Keystone Asphalt products were employed at the joints. Kapco tongue and groove joints, of ⅛-inch asphalt mastic board, were set tightly against the steel forms to provide a keyed longitudinal joint between the adjacent 25-foot lanes. Instead of driving the anchoring stakes through the punched holes provided, the contractor found it quicker merely to secure the 10-foot 1-inch sections with pins driven snugly against the center key portion of the joint.

Every 400 feet a Kapco 1-inch-thick transverse expansion joint was installed in a Star Lug assembly in which 1 x 15-inch dowels were supported on 12-inch centers. Because the job was fairly small, the contractor cut the transverse dummy joints by hand into the fresh concrete, rather than use a machine for that purpose. These contraction joints are 20 feet apart.

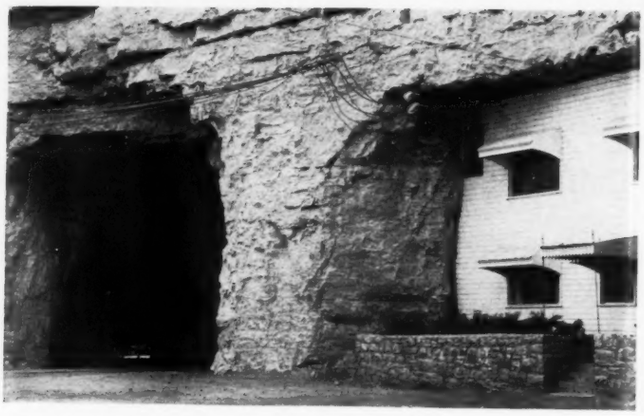
Paving and Finishing

A Koehring 34-E Twinbatch paver worked outside the forms, mixing each 1.407-yard batch a full minute before discharging the concrete in front of a Jaeger-Lakewood Type H dual-screed finishing machine. The concrete along the forms was vibrated with Viber units that were carried along on each side of the finisher. Next in line came a Koehring Longitudinal Finisher, followed by the conventional rolling bridges of the cement finishers who did the hand floating, straightedging, and joint work. Hunt Process was sprayed on for curing. The concrete

(*Continued on next page*)



Coarse aggregate for the concrete came from this rock cliff via the Cedarapids crusher. The primary unit is at left, the secondary at right.



Excavations into the cliff serve as refrigerated warehouses for Natural Storage Co., Inc., which has built its office in one of the openings.

Concrete Expansions For Airport Runway

(Continued from preceding page)

was protected with straw against the winter cold.

Joints were poured with Flintseal compound that was heated in an American Steel asphalt kettle. Type JFR jet-fuel-resistant material was used in joints within 500 feet of the end of the runway and taxiway, for protection against the hot blasts from the jet engines.

The Mix

Water for the concrete mix was obtained right at the airport, and was hauled out to the paver in two 1,200-gallon tank trucks. Lone Star air-entrained bulk cement from Bonner Springs, Kans., came 15 miles by rail to a batch plant just outside the airport property on a siding of the Union Pacific Railroad. The plant is a permanent commercial setup of Concrete Materials, Inc., which has plants located in both Kansas City, Kans., and Kansas City, Mo.

Sand for the mix was taken from the Kansas River near Muncie, Kans., and hauled in trucks 7 miles to the batch plant. The coarse aggregate, also supplied by Concrete Materials, Inc., was mined from a huge solid formation of limestone at Coldspur, Kans., 17 miles from the airport. The 1½-inch-down stone was shipped via the U. P., which has a short spur to the mine from its main-line tracks.

From the batch plant the dry concrete was hauled to the paver in a fleet of 11 to 20 trucks; each held two batches. Average haul was 1½ miles. The weights of a typical 8-bag batch are as follows:

Cement	750 pounds
Sand	1,773 pounds
Stone, 1½-inch-down,	2,715 pounds
Water, 35 gallons,	290 pounds
Total	5,528 pounds

Two-Way Radio

Of immeasurable help to the contractor was the Motorola 2-way radio system that was in use throughout the project. Five 60-watt units, either FM TU-80 or FM TU-30, were installed as follows: project manager's car, superintendent's car, master mechanic's service truck, engineering field party's panel truck, and field-office headquarters on the second floor of the airport-administration building. In addition there were two FH TU-1A 2-watt walkie-talkie sets—one at the paver and the other at the batch plant.

Operators of the walkie-talkie units usually called only the field office with their messages, which were then relayed to the proper receiver in the car or truck. The office unit was not a base station in the fullest sense of the word, since it was simply a set that was

mounted on a plywood board and plugged into a wall outlet through a trickle charger to a truck-storage battery. A standard auto antenna fastened to a base plate was set up on the roof of the administration building, with a lead dropping down to the field office below. As the contractor's top personnel remarked about their base set, "It's not pretty, but it works."

Besides the 2-way radios, the cars of the S. J. Groves key men were equipped with radio-telephones linking them with telephone utilities everywhere.

Personnel

S. J. Groves & Sons Co. was represented at the Fairfax Airport by Judd Mowry, Project Manager; J. F. Healey, Superintendent; C. A. Thompson, Office Manager; and Project Engineer Don Blager. M. T. Graham was Resident Engineer for the consultants—Burns & McDonnell Engineering Co. of Kansas City, Mo.

Out of the Rock

One of the Seven Wonders of Kansas is found at Coldspur, the siding on the Union Pacific where Concrete Materials, Inc., gets its coarse aggregate. A large bed of limestone, nearly a mile long and covering some 450 acres, rises to a height of about 90 feet above the Kansas River plain. The limestone is mined out in large chambers or tunnels, 40 feet wide between supporting rock columns, and from 20 to 22 feet high. This leaves an average overburden of some 70 feet of rock and dirt overhead.

Drilling and blasting are carried on in headings that have opened up the face of the cliff into seven large passages at ground level. Shovels load the blasted rock into Koehring Dumptors or end-dump

M. T. Graham, Resident Engineer for the consultant, and J. F. Healy, contractor's Superintendent.

Euclids that haul it a short distance from the mine to a 3-unit Cedarapids crushing plant.

From the receiving hopper the rock goes first to a 25 x 40 primary crusher, then to a 10 x 36 secondary crusher, and finally to a 40 x 33 hammermill. Deister vibrating screens are on all units, and the plant is electric-driven throughout. The processed rock ranges in size from crushed-stone aggregate down to screenings used as agricultural lime.

Only about 17 acres of the huge tract has been excavated so far, and part of this underground area is used by the Natural Storage Co., Inc., as a refrigerated warehouse. All but the entrance is enclosed by the solid limestone formation. It contains 150,000 square feet, or 2,400,000 cubic feet divided into rooms at uniform temperatures ranging from the natural underground temperature of 55 degrees F to 10 begrees below zero. Refrigerating equipment is installed to service about two-thirds of the excavated area.

The underground warehouses are used mainly for the storage in transit of food products in national distribution. They are equipped with inside tracks for refrigerator cars, loading and unloading docks, and truck-loading spaces. As the excavation proceeds, the floors of the chambers are paved with concrete. Future plans call for the early enlargement of the storage facilities to approximately 10,000,000 cubic feet. This ultramodern refrigerated underground warehouse has been in use only since 1947.

Graders Offer Choice Of Diesel Engines

Optional diesel engines are now available with two of the motor graders made by Galion Iron Works & Mfg. Co., Galion, Ohio. The Model 104 grader employs a General Motors 3-71.2-cycle diesel engine, rated at 85 hp; the Model 118 grader, a 104-hp 4-71 GM 2-cycle diesel. The graders may still be had with International-Harvester diesel engines, used exclusively until now.

Addition of the new line of engines gives the graders slightly more horsepower than was previously available. It is also an advantage for many grader users with GM diesel power in other equipment, as it enables them more readily to standardize their engines. Most moving parts from 3-71 and 4-71 GM diesels are interchangeable with any other 2, 3, 4 or 6-cylinder Series 71 diesel, as the bore and stroke is uniform throughout the series.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 631.

Olin Appoints Marvel V. P.

D. T. Marvel is the recently chosen Vice President for Sales of Olin Industries, Inc., East Alton, Ill. In his new position he will be responsible for sales, advertising, and marketing in the Arms and Ammunition, Metals, Explosives, Electrical, Ramset, and Export Divisions of Olin Industries—divisions administered by Executive Vice President F. S. Elfred.

Mr. Marvel came to Olin from National Tube Co., a subsidiary of U. S. Steel Co., with which he had been associated for 10 years.

St. Paul Promotes Brown

Leo M. Brown has been appointed Sales Manager of St. Paul Hydraulic Hoist, Minneapolis, Minn. He was previously a district manager serving company distributors in the south-central states and most recently, Assistant Sales Manager. The company manufactures truck dump bodies and hoists, Pax-All loading bodies, Frate-Gate elevating endgates, and Truck Patrol underbody maintenance blades.

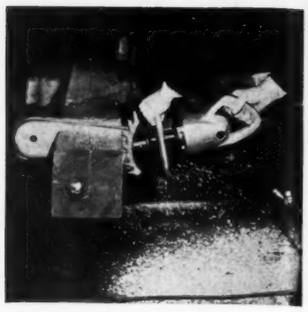
Electric Chain Saw

A new electric chain saw has been announced by the Porter-Cable Machine Co., Syracuse 8, N. Y. The Model 110 is a one-man saw suitable for topping, notching, and felling large trees, limbing, flush-cutting or undercutting main branches, and bucking logs and heavy lumber.

A feature of the saw is the design of the log-gripping teeth, which hold the saw against the work. The machine is said to spike and feed itself without jamming or pushing the saw into the wood. The lower teeth are longer than the upper, to save cocking the saw at an awkward angle when starting a cut.

The saw weighs 18 pounds and measures 29½ inches long, 6½ inches wide, and 9¼ inches high. The 14-inch cutter bar can fell trees up to 28 inches in diameter.

An ac-dc 115-volt motor develops



10 amps. A special 230-volt motor can be ordered. Two portable electric generators driven by gasoline motors are available as optional equipment to provide an independent source of power in remote locations. Other extra accessories may also be obtained.

For further information write to the company, or use the Request Card at page 18. Circle No. 558.

Film on Barber-Greene Line

A 16-mm sound-color film has been produced by Barber-Greene Co., Aurora, Ill., to show the company's entire line of equipment for material handling and processing. Paul Harvey, American Broadcasting Co. radio and TV news commentator, is narrator for "Specialty: The Better Way". On the 22-minute reel he discusses design and manufacturing features, functions, and applications of the company's equipment. Included in this are permanent and portable belt conveyors; wheel and crawler-mounted bucket loaders and ditch diggers; and bituminous-paving equipment. Each type of machine is shown in operation and in a variety of applications.

The film is available on loan by contacting local Barber-Greene distributors, or by writing directly to Wayne D. Adamson, Jr., Advertising Manager, Barber-Greene Co., Aurora, Ill.

Timber-Connector Rings

Split-ring timber connectors are described in a folder released by the Marsh Co., Hastings, Nebr. Typical construction applications of the Timberlock ring are illustrated. A price list is enclosed.

The company's tool for cutting grooves to install rings is also described. The manufacturer points out, however, that both rings and tools are interchangeable with other companies' standard-sized parts.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 659.

New Soil-Testing Services

Soil Testing Services of Michigan, an affiliate of Soil Testing Services, Inc., Chicago, Ill., opened its offices and laboratories for the first time in Portland, Mich., last January.

Robert Torp-Smith, former Civil Engineer with the U. S. Navy, is head of the newly organized affiliate, and under his direction the firm will specialize in soil mechanics, foundation problems, and subsurface explorations in the Michigan area. Other members of the new firm are John P. Gnaedinger, Carl A. Metz, and Theodore W. Van Zelst.

A New VA Hospital For Oklahoma City

Nearly 200 Bell-Bottomed Caissons Founded Down to Rock Support 11-Story Steel Structure To Be Completed This Month

Unit B of Oklahoma City's new Veterans Hospital. With the new concrete floor slabs poured and the beams and girders encased in concrete, workmen set the brick facing.

• LATEST addition to Oklahoma City's mushrooming medical center is a 500-bed Veterans Hospital. Located little more than a mile from the downtown area, it is away from the commercial developments yet conveniently reached from any point in the capital city. Robert E. McKee General Contractor, Inc., El Paso, Texas, submitted the $7,024,000 low bid for the construction of the 11-story steel structure. The Veterans Administration, owner of the structure, awarded the contract July 28, 1950. Work started the following September, but repeated delays in steel delivery held the job up all along the line so that the structural work was carried on until mid 1952. Completion of the hospital, requiring installation of thousands of dollars worth of up-to-date medical apparatus, is expected some time this month.

Design

The design and supervision of construction was administered by the VA's Washington, D. C. office. The project includes the main hospital building, apartment building for the medical staff, attendants' quarters, a boiler house, a laundry building, a recreational hall, a 165-foot chimney, and a 3,000-cubic-foot underground reservoir for softened water.

The main building consists of two units separated by an expansion joint. The plan is irregular in shape, measuring 312 feet 6 inches in one direction and 327 feet in the other. The elevation breaks off at various levels from the 8th to 11th floors—most at the 9th. The hospital also includes a ground floor and the basement, making the total height of the building 153 feet. Total enclosed space is over 5,000,000 cubic feet.

The frame is of riveted-steel construction encased in fireproofing concrete. The reinforced-concrete floors are of flat-slab design. They average 4½ inches thick, reinforced with ½-inch-round bars 5 to 8 inches on centers. The building is supported on bell-bottom caissons founded down to rock. There are 186 caissons in all, ranging in diameter from 2 feet 6 inches to 4 feet. The bell bottoms range from 4 feet 3 inches to 8 feet 6 inches in diameter. The average depth is 20 feet.

Brick and tile form the exterior walls and interior partitions. Spex call for metal door frames with solid-core birch doors. The reversible wooden sash windows—they slide and pivot both—can be washed inside and out from inside the rooms. Most of the rooms have a plaster wall finish; some have tile; the lobby and the operating rooms

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A New VA Hospital For Oklahoma City

(Continued from preceding page)

are marble. All tile rooms have coved corners. The steel stairs have a terrazzo tread. Corridors are terrazzo; the room floors, asphalt tile. Ceilings are suspended acoustical tiles. Toilet units are hung from the walls to provide clear floor areas.

The building will have a complete pneumatic-tube system for dispatching correspondence, directives, etc. The hospital will be air-conditioned.

Excavation

Lawnco Construction Co., of Oklahoma City, took the grading and excavation subcontract—about 43,000 cubic yards in all. The soil was a hard red clay; the rock a firm tight limestone. Lawnco removed about 8 inches of topsoil and stockpiled it for later use in landscaping. The ground sloped from east to west, requiring a 30-foot-deep cut on the east side of the building. The clay was very stiff though and the near vertical face (1 to 10) held its slope for more than 18 months during the construction of the building.

Riveting is in progress on the hospital job in Oklahoma City. Steel workers below flip the hot rivets to these men above.

Three 16-yard Tournapulls handled the earth cuts. In some spots the going was rough—two layers of soft limestone, up to 2 feet thick, lay in the clay above bedrock. These were blasted out and loaded into 8 to 10 dump trucks by a 1-yard shovel and a ½-yard backhoe. A couple of International TD-24 dozers handled sundry jobs on the grading and excavation.

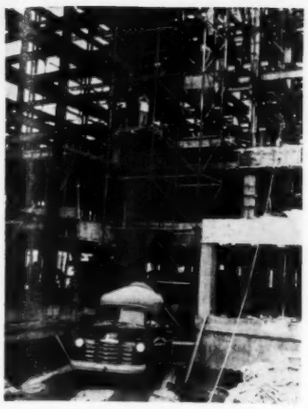
McKinney Drilling Co., Nacadoches, Texas, took the sub on the caisson drilling. The bedrock lay about 19 feet below the basement floor; the caissons varied in depth from 12 to 34 feet. They were taken down to a rock that would meet the specified 10-ton-per-square-foot bearing load. A core-drilling Williams hole digger tail-mounted on a flat-bed truck handled all of the work. After the shafts—up to 4 feet in diameter—were drilled, a 2-inch drill was shoved down another 8 feet to be sure there was no fissure of voids underneath. Then a worker was lowered into the hole to chip out the bell bottom. The bells were widened out to 8-foot diameters for some caissons.

Bedrock-Bearing Tests

Specifications called for three load-bearing tests to be made on the rock. Design load was 20,000 pounds per square foot, but the tests were to be carried to 100,000 pounds. The general contractor performed the tests. Oklahoma Testing Lab read the gages during the test and furnished the VA with full test reports.

McKee improvised on the hydraulic jacking method, rather than applying a brick, steel rail, or other cumbersome load for the test. This was the test setup used: two 16-inch channels back-to-back acted as the jacking frame. Two heavy stiffeners between the channels and end plates welded to the channels secured them as a unit. The 1⅜-inch-round cold-rolled anchor rods were carried 8 feet into the bedrock. Weld rings, 6 to 8 inches apart along the ends of the rods, and a poured sulfur grout anchored them into the limestone. The 50-ton Simplex jack rested on a special base to assure true vertical bearing. The 2½-inch-thick bottom plate was circular in shape and equal in area to exactly 1 square foot. The plate was set on a layer of grout to assure uniform bearing. The other two base plates—6 x 6 x 1-inch and 3 x 3 x 1-inch—were machined to admit a 1⅛-inch ball bearing between them. The plate above the jack was 6 x 6 x 1 inch.

Settlement under load was measured at three points equidistantly spaced on the outer edge of the circular base plate. The gages were attached to independently fixed supports, anchored into the limestone with ⅜-inch bolts. Thermometer readings taken in the hole enabled



A 1½-yard bucket carries concrete up a 170-foot Archer double tower.

the engineers to account for any change in length of the rods due to change in temperature.

Technicians applied the load in 5-ton increments, with 10-minute "holds" in between. The total load, 50 tons, was left on for 8 hours. The ultimate deflection was 0.086 inch. The load was removed in ¼ increments every 5 minutes and then reapplied under continuous loading. The resultant deflection was 0.075 inch.

Steel Erection

John F. Beasley of Muskogee, Okla., subcontracted the steel erection. A Manitowoc Model 3500 with a 120-foot boom and a 20-foot jib handled all members up to the 8th floor. A 35-foot Chicago boom handled the three top floors. A 2-drum American hoist supplied the lifting power. The crane set interior steel first, working out to the building line on each floor. The Chicago boom worked in an irregular pattern.

Steel erection proceeded well ahead of the riveting. Beasley pinned and bolted all column splice holes and at least a half of the other connections. Each floor was also guyed to the floor below it.

Virginia Bridge Co., Roanoke, Va., supplied the steel from its Memphis, Tenn., plant. At first, they shipped it to Oklahoma City by rail and transferred it to trucks to bring it to the job. Later they shipped it all the way by truck.

Beasley had up to 6 riveting crews working at a time. The crews used Boyer No. 90 hammers powered by IR 210-cfm electrically driven compressors. A 2½-inch pipe conducted the air up to a receiver on the working deck. From there on it passed through 1¾-inch hose.

The rivets ranged in size from ¾ to 1⅛ inches; most were ⅞ inch. They were heated in coal-burning Buffalo and Champion forges.

Concrete Operations

Every beam and column in the hospital is encased in reinforced concrete. The transit-mix concrete was supplied by a portable plant which McKee had set up on a railroad siding about a mile from the job. The plant was a Blaw-Knox 4-compartment 50-ton unit fed by a Bay City 45 with a ½-yard bucket working the aggregate stockpiles. Cement was brought up to the compartment by screw conveyor. McKee used Ideal Type I cement. Hauls were short, so McKee used 2-yard mixer bodies, 4 Jaegers and 1 Smith, mounted on light Chevrolet and GMC trucks.

Spex called for a 3,600-pound concrete for the caisson and 3,000-pound concrete for the rest of the work. Batches, based on a 1-yard mix, consisted of (in pounds):

	3,600-pound Mix	3,000-pound Mix
Rock (1½-inch max.)	1,962	....
Rock (¾-inch max.)	....	1,594
Sand	1,405	1,707
Cement	430	425
Water	267	292
Pozzolith	2.29	2.26

All concrete forms were made up on site except those for the foundation; they were uniform panels. A DeWalt 12-inch radial-arm, a CMC 16-inch rip, and a few portable Skil saws handled the cutting.

All beam and column forms were made up with 1 x 8 sheeting. Symons clamps and accessories secured the forms. The beams were shored up either by Acrow adjustable shores or 4 x 4 posts 40 inches on centers. The contractor had about 1,000 of the Acrow shores on the job during its early stages and secured another 500 later on to eliminate the use of 4 x 4 posts.

McKee used adjustable bar joists 14 inches deep and up to 24 feet long to support the slab forms. These forms were 1 x 8 sheeting made up into panels to fit between the beams. The bar joists were set on a 2 x 4 nailed to the side of the bottom form and blocked down to the shore. The joists were supplied and erected by Adjustable Forms, Inc., Minneapolis, Minn.

An Archer double tower with a 1¼-yard trip bucket carried the concrete up to the working floor. The double tower was 170 feet high and had a 7 x 9-foot platform in the second frame. It also had a 30-foot Chicago boom up some 140 feet from the ground. A 3-drum American hoist driven by a Waukesha engine powered the three load lines—bucket, platform, and boom.

The trip bucket delivered the concrete into a small hopper on the working floor. Rubber-tired buggies carried it from the hopper to the

(Concluded on next page)

A New VA Hospital For Oklahoma City

(Continued from preceding page)

forms. Viber portable electric vibrators assured complete consolidation in the forms.

Quantities and Personnel

The following is a list of the quantities on this project:

Forms	539,261 sq. ft.
Concrete	17,000 cu. yds.
Reinforcing	800 tons
Wire mesh	500,000 sq. ft.
Excavation	43,000 cu. yds.
Structural steel	3,200 tons
Face birch	1,505,000 units
Common birch	810,000 units

The contractor employed about 300 men on the job. They worked a single day shift, 40 hours a week. The construction forces were under the direction of Kenneth R. Simmons, General Superintendent for Robert E. McKee General Contractor, Inc. John M. McKee was Chief Engineer for the contractor. C. D. Ratcliff was Superintendent for John F. Beasley, subcontractor on the steel erection.

The Veterans Administration retained four Resident Engineers on the job: J. A. Marmouget, J. J. Cullen, E. A. Huebner, and C. B. Parsons.

Master Vibrator Sales Mgr.

Robert H. McCormick is the new Sales Manager for Master Vibrator Co., Dayton, Ohio, manufacturers of generators, concrete vibratory and finishing equipment, tampers and space heaters. He will work with the company's distributors in the United States and Canada.

Mr. McCormick has had many years' experience in the sales field. He comes to Master Vibrator directly from International Business Machine Co.

Welding Transformer

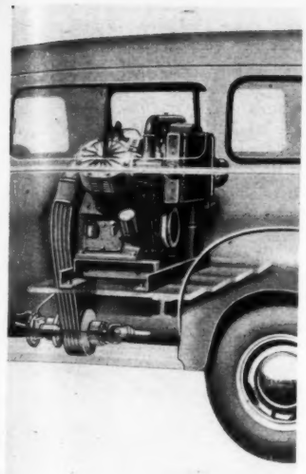
A 300-amp ac welding transformer, with stepless current selection from 40 to 375 amp, has been announced by the Welding Department of General Electric Co., Schenectady 5, N. Y. The unit has an enlarged scale and finely threaded screw adjustment to facilitate current selections. A range switch enables the operator to change quickly from high to low, or low to high.

The new welder, 36 inches high, 21 inches in diameter, and 328 pounds in weight, is suitable for light-duty low-current sheet-metal work as well as heavier-duty high-current industrial jobs. It accommodates electrodes from $\frac{3}{32}$ to $\frac{1}{4}$-inch diameter. Arc-stabilizing capacitors enable the operator to strike and maintain an arc without popouts, the manufacturer states.

For further information write to the company, or use the Request Card at page 18. Circle No. 602.

New Wire-Rope Warehouse

A new warehouse of American Chain & Cable Co., Inc., Bridgeport, Conn., recently opened at 42-16 Eleventh St., Long Island City, N. Y. It carries a complete line of wire rope, wire-rope slings, etc.



The Auto-Air 105-VBA compressor is driven directly from the truck engine through a power takeoff.

Compressor for Truck

A new compressor assembly for mounting on standard panel trucks is announced by Davey Compressor Co., North Water St., Kent, Ohio.

The Auto-Air Model 105-VBA delivers 105 cfm at 100 pounds pressure. It is driven directly from the truck engine through a Davey P-80 heavy-duty power takeoff. The compressor occupies only one-third of the truck body, leaving the remainder open for the transportation of men, tools, and materials.

For further information write to the company, or use the Request Card at page 18. Circle No. 644.

Data on Fluted Steel Piles

A 24-page catalog on fluted steel piles has been released by The Union Metal & Mfg. Co., 1400 Maple Ave., Canton 5, Ohio. It describes the Monotube and gives specifying data. The catalog includes typical installation photos, test-driving data, and other technical information of interest to engineers and contractors.

To obtain this literature, write to the company, requesting Catalog No. 81, or use the Request Card at page 18. Circle No. 660.

Remote-Control Radio

A new remote-control unit for mobile radio communication systems is announced by RCA Victor Division, Radio Corp. of America, Camden, N. J. The new unit is used with the Carfone and Fleetfone systems, but can be incorporated into all other mobile systems operating in the 30 to 50 or 152 to 174-megacycle bands.

The RCA Type CC-8A unit consists of a speech amplifier, power supply, speaker amplifier, loudspeaker, and complete set of controls. It operates satisfactorily over a single pair of telephone wires for distances up to 10 miles between the control point and the remote equipment. The unit operates from 110 to 117-volt, 50 or 60-cycle power supply, and has a rated power consumption of 68 watts.

The new control unit is provided with a steel cabinet measuring 6 inches deep, 13½ inches wide, and 9½ inches high. It weighs only 19 pounds, and can be conveniently mounted on a desk, table, or shelf.

For further information write to the company, or use the Request Card at page 18. Circle No. 569.

Two Engineer Firms Unite

Two consulting-engineer firms recently announced their affiliation. They are Baker & Spencer, Inc., New York, N. Y., and Frederic R. Harris, Inc., also of New York City. E. J. Quirin, President of Harris, Inc., has been appointed President of the combination, and C. G. Spencer, one of the founders of Baker & Spencer, will be Vice President of that company and consultant to the new company.

Baker & Spencer and Harris, Inc., were both founded in 1927.

Crane and Shovel Booklet

A series of eight articles by E. O. Martinson discussing the use and application of power cranes and shovels has been issued by Koehring Co., Milwaukee, Wis.

Published and reprinted by permission of the Power Crane & Shovel Association and *Construction Methods and Equipment*, the 32-page booklet contains a detailed account of the basic principles of power-shovel and crane operations. Choice of the correct equipment, safety considerations, and operating costs are some of the subjects covered. There are numerous photographs and diagrams.

Copies of "Power Cranes and Shovels" may be obtained from any Koehring distributor, or by sending a request to the Koehring Co., 3026 W. Concordia Ave., Milwaukee 16, Wis.

Portable Ready-Rigged Self-Erecting Hoist

A 2,000-pound-capacity trailer-mounted hoisting machine that raises either a self-dumping ½-cubic-yard concrete bucket or a removable platform is offered by Buck Equipment Corp., 208 Butler St., Cincinnati 2, Ohio. It can be set up and ready to operate in less than 25 minutes, the company reports.

The hoist is self-erecting to 40 feet. Additional sections are available in 10 and 5-foot lengths. It unfolds like a jackknife, saving setup time. When the tower goes up, the trailer wheels retract; they return to a towing position when the tower is lowered. Hoisting speed with capacity load is 100 feet per minute.

For further information write to the company, or use the Request Card at page 18. Circle No. 620.

Book on Foundations

"Foundation Engineering", by R. B. Peck, W. E. Hanson, and T. H. Thornburn, is published by John Wiley & Sons, Inc., New York, N. Y. Arranged in four parts, the book develops the material in logical sequence: Part A is concerned with the properties of subsurface materials and explains their identification and techniques for their investigation. Part B deals with types of foundations and methods of construction. Part C helps the reader in the selection of a foundation type and the basis of design. Part D discusses structural design of foundation elements. Emphasis throughout is on the more ordinary types of foundations. The material is illustrated by numerous designs.

This book may be obtained by writing to John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. The price is $6.75.

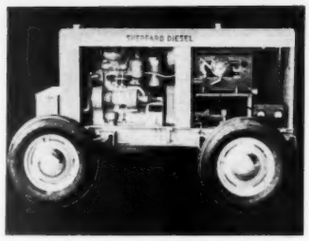
New Manager for Trailmobile

Trailmobile, Cincinnati, Ohio, has named Walter Hasenzahl, Jr., General Manager of manufacturing. Mr. Hasenzahl was formerly Industrial Engineer at the Cincinnati plant and in charge of the extensive plant relayout program recently started there. He succeeds S. E. Biggs, now associated with Youngstown Steel Car Corp.

Portable Arc Welder

A new line of small portable arc welders, powered by diesels, is being introduced by R. H. Sheppard Co., Hanover, Pa. These are said to be the first arc welders of 200, 300, and 400-amp capacities to be powered with a diesel. The smallest of the Sheppard arc welders, including the diesel, is 45⅝ inches high, 27½ inches wide, and 63½ inches long on a skid base.

The new welder features a multi-V-belt drive which steps up the generator speed to 3,500 rpm. This permits the use of a smaller generator and power unit to equal the output of larger direct-drive sets.



One of the new, small, diesel-powered Sheppard arc welders.

The welders are built as integral units mounted on 4-wheel trailers. Models are also available mounted on steel I-beam bases.

For further information write to the company, or use the Request Card at page 18. Circle No. 661.

Data on Pipe Benders

Data on pipe benders are available from Gustave Lidseen, Inc., 837 South Central Ave., Chicago 44, Ill. The two models of portable pipe benders illustrated are for pipe sizes ranging from ½ inch to 1½ inches in diameter. Pipe benders for thin-wall conduit are also made.

The benders are shown with and without a stand. They may be attached to any brace, beam, or 2 x 4.

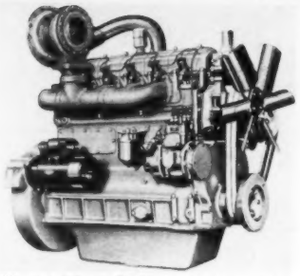
To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 662.

Two Diesel Engines

Two new diesel engines are offered by the Waukesha Motor Co., Waukesha, Wis. Models 135-DKBS and 6-WAKDS are 6-cylinder 4-cycle diesel engines of 426 and 1,197-cubic-inch displacement respectively. They burn all standard high-speed diesel fuels having octane values of 45 or above.

The exhaust-turbocharger system of supercharging gives an increase in horsepower, even without an intercooler, from 146 hp to 185 hp at 2,800 rpm for the smaller unit. The heavier model increases from 230 hp to 352 hp at 1,800 rpm.

Other advantages of the exhaust turbocharger are a relatively light and compact installation, flexibility in mounting, and the elimination of mufflers on most applications due to the smoothing out of the exhaust impulses by the turbocharger turbine.



The Model 135-DKBS 6-cylinder 4-cycle diesel engine has a 426 cubic-inch displacement, and installs easily.

For further information write to the company, or use the Request Card at page 18. Circle No. 599.

Chas. T. Hvass Dies

Chas. T. Hvass, Vice President of E. D. Etnyre & Co., Oregon, Ill., manufacturer of asphalt and oil distributors, died on January 9 at the age of 63.

Mr. Hvass was an active participant in the American Road Builders' Association, as well as in many state associations on the eastern seaboard.

The JR-38 Jackdrill with new coupling operates as an integrated unit with its pneumatic leg support.

Air-Leg Rock Drill Eliminates One Hose

A rock drill that operates integrally with its pneumatic leg support is made by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. Air is fed to the pneumatic leg through a new coupling between the leg and the drill. In this way a special air-leg hose is eliminated. The JR-38 Jackdrill is the first integrated air-leg rock-drill unit, according to the manufacturer.

All controls are grouped on the drill backhead. A 5-position throttle gives uniform control of all operations. Since the throttle valve shuts off feed-leg air, the leg can be shortened or removed without closing the feed-leg valve. The leg is detached by loosening one nut. The unit may be used as a stopehammer, drifter, or jackhammer.

The Jackdrill comes with 2, 3, and 4-foot legs and a full range of drill rotations. With the 3-foot leg the unit weighs 88 pounds.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 562.

Tubular-Frame Conveyors

A bulletin on tubular-frame conveyors is available from the E. F. Marsh Engineering Co., 4030 Chouteau Ave., St. Louis 10, Mo. Mechanisms of the conveyors such as the loading hopper, the belt takeup, and the drive system are discussed. Tubular truss frames are said to resist misalignment because of their strength and rigidity. Photographs show several Marco conveyor installations handling sand, gravel, and crushed rocks.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 588.

Spoon River Plant for AEC

Spoon River Plant, a new explosives processing and assembly plant for the United States Atomic Energy Commission, will go into construction this spring on a site in Fulton County, Ill., about 18 miles east of Macomb, Ill., and 55 miles southwest of Peoria, Ill.

Approximately 9,800 acres of this Government-owned land, which is the site of the former World War II Camp Ellis, has been turned over to the AEC for the Spoon River project, estimated to cost about $29,000,000.

W. A. Curtis has been appointed Project Engineer in charge of construction, and Fluor Corp., Ltd., Los Angeles, Calif., is Architect-Engineer.

U. S. 40 Is Widened To 44-Foot Pavement

Illinois Concrete-Paving Contractor Keeps Road Open to Traffic While Excavation Goes On

• ONE of the worst of a contractor's headaches is traffic. Maintaining a traffic way on a heavily traveled highway through a small city can be a sizable problem when added to the ever-present hazards of weather, materials and labor.

Such a situation was being well overcome by Mautz & Oren, Inc., of Effingham, Ill., when CONTRACTORS AND ENGINEERS visited a job site near Effingham last year. Men were busy on the firm's contract for widening U. S. 40 through Effingham from the ancient 23-foot-wide brick to a modern 44-foot width—while a summer-traffic count of more than 10,000 vehicles a day had to be flagged.

U. S. 40, one of the oldest transcontinental highways, has in recent years acquired a reputation for being well worn and considerably outmoded, but now throughout its length there are dozens of modernizing jobs going on which will put it in the rank of modern highways adequate for any traffic. When it was routed through Effingham in the Model T days its 23-foot brick seemed wide, but now it is increased to 40 and 44 feet and the widening took 120 trees that averaged more than 30 inches in diameter, or a total of 3,500 inches. Underground and overhead utilities had to be moved or worked around during the grading and excavating, and this served to complicate the job.

The road improvement was a Federal project, financed by the State of Illinois and the Federal government. The contract was awarded to Mautz & Oren, Inc., for $240,147.17 on June 23 and work started on June 30, 1952.

The job covered a distance of 5,843.5 feet or 1.099 miles. It began at a point near the western boundary of Effingham, where Fayette Avenue intersects Henrietta Street, and extended in an easterly direction to Willow Street. It continued on Third Street from Fayette to the intersection of Jefferson Street. To get there, it crossed four railroad tracks. The official title of the job was concrete widening for State Routes 11 and 25 and U. S. Highways 40 and 45.

Preparing Right-of-Way

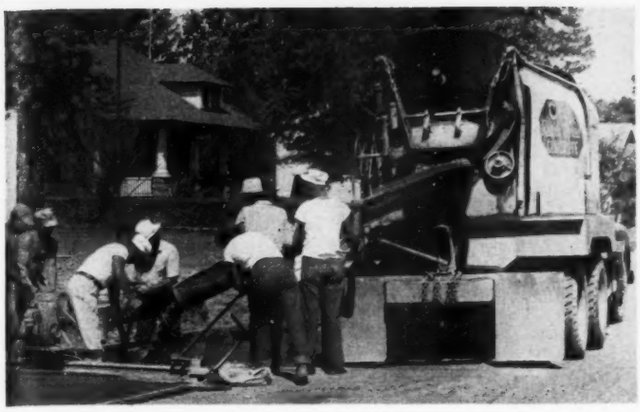
First thing on the program was to clear the new right-of-way to 40 and 44-foot widths and this included the removal of the 120 old trees already referred to. Because of the provisions requiring the contractor to provide for the regular flow of traffic over the route on which he was working, it was found impractical to doze the trees and dynamite was out of the question.

The problem was solved by trimming the trees with a chain saw, trucking off the limbs, and then hooking a wire cable to the trunks and pulling them out with a Hyster winch on a Caterpillar D6. This eliminated the seesawing that would have been necessary if the trees had been dozed. The uprooted trees were picked up with a Lorain TL-25 crane with a 30-foot boom and dumped into a LaCrosse semi-trailer with a Diamond T tractor. Digging out the trees required three weeks, but the traffic flow was not interrupted. Trees were dumped in a pre-selected site out of town.

After the trees were removed, several thousand feet of existing 12-inch storm-sewer tile had to be excavated and the old curb and gutter and sidewalk had to be demolished. Breaking was accomplished with two Cleveland pavement breakers supplied with air from a Schramm 160-cfm compressor.

The bigger chunks of broken concrete which interfered with easy loading of the dragline bucket were loaded by hand into 3 Dempster-Dumpster 1-yard pans which were hauled away as fast as they were filled by a Chevrolet truck equipped with a Dempster pan-loading device. A Koehring ½-yard dragline with a 25-foot boom was assigned to the job of cleaning this up and excavating to the old sewer line.

The dragline dumped into the contractor's fleet of dump trucks, which



Concrete is delivered to the Effingham, Ill., paving job in a Jaeger 3-yard transit mixer.

A Master vibratory screed strikes off the placed concrete. *Houck Photos*

consisted of 4 Chevrolets and 1 Dodge, all of which were equipped with Anthony hydraulic dump bodies.

Where no excavation was required below grade, the debris created by the paving breakers was picked up and loaded into the trucks by two Case tractors with ⅝-yard front-end loaders. Bulldozing required was provided by an International TD-14.

The Case tractors were also used for the rough grading of the new subbase area. Existing center paving which was to be left intact was undercut by hand and the edges cleaned. Subgrade was also finished by hand and any below-grade spots were bottom-filled with sand to subgrade. All subgrades were then thoroughly compacted with a Galion 10-ton roller.

New Paving

The old highway route was a brick-paved city street consisting of a 2-inch base layer of sand under 4 inches of plain concrete with conventional paving brick laid edgewise on top, making a total thickness of 8 inches on 2 inches of sand. Much of this paving was in good condition and the contract specified leaving it intact except in a few places where it was to be entirely removed. Other bad places were to be patched.

The entire newly widened thoroughfare later received a 3-inch cover of I-11 bituminous concrete in a separate contract let to Jefferson Asphalt Co. of Mt. Vernon, Ill., for $56,246.27. This gives the street a uniform surface from curb to curb.

When the job was visited, each side of the 23-foot brick-topped center was being given a new plain concrete base 9 inches thick and ranging in width from 8 feet 3 inches to 10 feet 3 inches, which would give a maximum width of a little less than 44 feet. Concrete forms were 9 x 9-inch Blaw-Knox steel forms and they were laid on the outside at the curb line while the other side of the strip was formed by the existing pavement which had been undercut and cleaned.

Concrete was delivered to the job in 3-yard Jaeger transit mixers on Chevrolet and GMC trucks of the C-J Ready-Mix Co., Effingham. The trucks used the center strip and unloaded to either side that was ready. In most cases traffic which was using the center strip had to be halted for about five minutes. Concrete for the widening was a 6-bag mix with a 1.5 cement factor. For the patching, a 7-bag mix with a 1.75 cement factor was used. Coarse aggregate was graded from 2-inch down. Concrete was vibrated with Chicago Pneumatic Hicycle, Jackson, and White vibrators. A Master vibratory screed was used in striking off the concrete. For curing, Mac-Seal curing compound was used. This was sprayed on with a job-built sprayer that consisted of a

(*Concluded on next page*)

U. S. 40 Is Widened To 44-Foot Pavement

(Continued from preceding page)

30-gallon hot-water tank as a container and a cylinder of oxygen as a pressure source. The oxygen was fed at proper pressure through a conventional regulator to the container tank and all was mounted on a pneumatic-tired cart. Despite the traffic and other interruptions common to the busy section of a small city, the concrete was poured at the rate of 100 cubic yards daily and the force employed totaled 80.

The only reinforced concrete on the job was used for the curb and gutter, which were reinforced with ½-inch steel curb-and-gutter bars from the Laclede Steel Co.

Quantities

Excavation consisted of 6,000 cubic yards. New reinforced concrete for curb and gutter amounted to 12,000 linear feet, and there was 10,000 square feet of new sidewalk. Concrete in the 9-inch base-course widening totaled 14,000 cubic yards.

A Schield Bantam ⅜-yard backhoe excavates a trench for a 24-inch concrete storm sewer on the U. S. 40 widening project.

Mautz & Oren is one of the few construction companies in the country headed by a woman. Mrs. A. F. Oren has held the title of President since her husband died 15 years ago. W. P. Mautz is Secretary-Treasurer and R. E. Hedgcock is General Superintendent.

Chas. P. Casey is Director of the Illinois Department of Public Works and Buildings and F. N. Barker is Chief Highway Engineer. R. H. Major is District Engineer of District 7 and Harold Wear is Project Engineer.

New Wrench Releases At Any Torque Setting

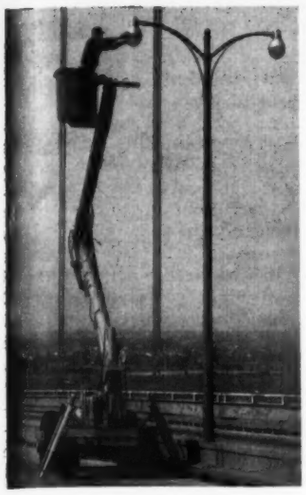
A new wrench for nut and bolt torquing is announced by the Plomb Tool Co., 2209 Santa Fe Ave., Los Angeles 54, Calif. The Proto wrench is a torque-limiting device and not a torque-indicating device. The desired torque is set on the wrench by turning the handle. When the right torque is reached the wrench releases automatically. The torquer then resets for the next operation. The principal torque-controlling element is an enclosed spring under compression.

For further information write to the company or use the Request Card at page 18. Circle No. 568.

Data on Aggregate Dryers

A bulletin on aggregate dryers has been released by the Iroquois Division, Posey Iron Works, Inc., Lancaster, Pa. It discusses details of the frame, shell, and combustion chamber of the units. Information on sizes, accessories, and special applications is included.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 563.



Compressor-Tractor Mounts Crow's Nest

A crow's nest mounted on a rotating articulated boom has been adapted to its Pneumatractor by Schramm, Inc., West Chester, Pa. The Skyworker has a capacity of 500 pounds and will raise one or two crow's nests carrying two men.

Operation is controlled either from the crow's nest or the ground. Working height is 36 feet from the ground and working reach is about 28 feet out from the center of the turret. The crow's nest, which is insulated against high voltage and electrical contacts, rotates 360 degrees.

For further information write to the company, or use the Request Card at page 18. Circle No. 619.

Timber Company's New Book

"One Hundred Years of Engineering Progress with Wood" is the title of a recent publication by Timber Engineering Co., Washington, D. C. The book is a compilation of 21 papers and 6 discussions that were presented at the Wood Symposium held during the Centennial of Engineering Convocation in Chicago last fall. Containing a number of illustrations, it traces a century's development of wood, from a natural resource with broad utility value and little-known strength, to an engineering material with predetermined load-bearing capacities, and countless industrial and artistic uses. Working stresses, structural lumber grades, and laminated timber are some of the phases of wood utilization cited in the papers, as well as engineering progress with wood building.

Limited numbers of the book are available, free of charge. Write to Timber Engineering Co., Dept. WS-E, 1319 18th St., N. W., Washington 6, D. C.

Slide Rule Computes Concrete Volume

A new pocket-size concrete-volume computer is available from the Plastilite Products Co., 17 Byron St., Providence 3, R. I. The computer is a vinylite slide rule with four rows of calibrations labeled A, B, C, and D, reading from top to bottom and representing respectively: thickness; width (or height); length; and volume in cubic yards.

The back of the computer may be used as an advertising medium.

For further information write to the company, or use the Request Card at page 18. Circle No. 567.

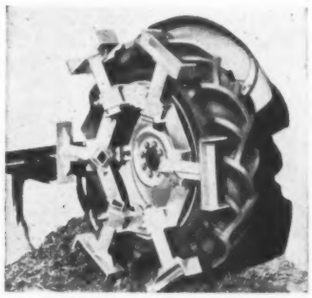
Dietz Takes Over Embury

After 44 years in the lantern industry, the Embury Mfg. Co., Warsaw, N. Y., has retired from business. R. E. Dietz Co., Syracuse, N. Y., has taken over its property and equipment, and will service its customers.

Dietz will offer the Warsaw plant for sale and will take on some members of the Embury engineering and sales staff. The new setup enables the 112-year-old Dietz organization to offer a comprehensive line of highway torches, and kerosene, contractors', railroad, and other lanterns.

Tractor-Wheel Lugs

Retractable lugs for rubber-tired tractors that permit operation in mud, snow, ice, rock, sand, on hills, and on hard ground are announced by Comco, Box 983, Kilgore, Texas. A framework supporting the lugs is bolted on the outside of the tractor wheel, using the tractor's own wheel bolts. The lugs extend beyond the width of the tractor tire for adverse conditions and retract for travel on a hard-surfaced road. Only a wrench is needed to extend or retract the lugs, according to the manufacturer. Vise-grip lugs are available for all standard tractor tires.



For further information write to the company, or use the Request Card at page 18. Circle No. 616.

Folder on Rear-Dump Truck

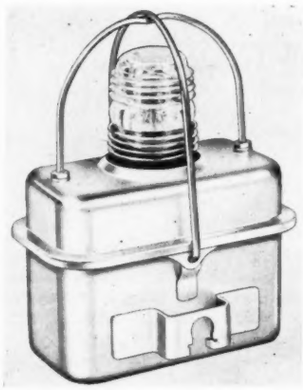
A folder on a rear-dump truck that handles loads up to 12 yards has been issued by the Sterling Division of the White Motor Co., Milwaukee 1, Wis. The Plan-A-Power truck has a Marion rock body and telescopic hoist. The folder gives specifications, etc.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 663.

Neon Warning Signal

A new neon warning signal for use on barricades is announced by the Emarco Corp., P. O. Box 615, Far Hills Station, Dayton 9, Ohio.

The Model AW-C Thoro-Flare mounts so that the light is above the barricade and visible from all directions. The signal, which is attached by a bolt and lockwasher to discourage theft, starts to flash instantly when placed in an upright position. The flasher is fired by a sealed power-pack unit with a mercury switch and electronic flasher. The neon tube is rubber-mounted and shockproof. The unit is 8 inches high, 6 inches long and 3½ inches wide. It weighs 6 pounds complete with battery.



For further information write to the company, or use the Request Card at page 18. Circle No. 611.

Factory-Made Buildings

A 24-page brochure describing a factory-produced steel building has been issued by the Soule Steel Co., 1750 Army St., San Francisco 24, Calif. Detailed drawings, charts, photographs, and descriptive material explain the design, construction, and function of the clear-span rigid-frame Steeline buildings.

They are available in 32-foot to 70-foot widths; lengths come in multiples of 20 feet. Units may be combined to make wider structures.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 585.

Health and Productivity

The Office of Defense Mobilization has released a set of pamphlets dealing with the health of workers on the job, absenteeism, efficiency of women in industry, and the contribution of disabled workers.

This set, including "The Disabled Can Work", "Production at Any Age", and "A Job for Women", may be obtained, while the supply lasts, from Dr. W. H. Aufranc, Director, Health Resources Staff, Executive Office of the President, Office of Defense Mobilization, Washington 25, D. C.

All-State Welding Promotes

All-State Welding Alloys Co., Inc., White Plains, N. Y., has appointed Walter E. Palmer to the position of Sales Manager. He joined the company in 1951, worked in sales and engineering, and specialized in the improvement of welding materials and practices.

Concrete-Column Molds

A booklet on steel molds for round concrete columns is available from the Des Lauriers Column Mould Co., Inc., 7722 Joy Road, Detroit 4, Mich. Steel molds are said to expand appreciably less than molds of other materials and to make a surface that needs less touching up. The manufacturer also points to the saving in concrete in round columns as compared with other shapes.

The booklet shows sketches of molds for column capitals, a typical beam fitting, framing, and floor openings. A table tells the volume of concrete needed for columns of specified diameter and height.

To obtain this literature write direct to the company, or use the Request Card that is bound in at page 18. Circle No. 606.

Weekly Pay Checks Prepared in the Field

Contractor Uses Printing Calculators in Field Offices To Speed Timekeeping, Billing, and Invoice Checking

By M. W. STAPLES, Oklahoma Contracting Co., Dallas, Texas

• PAYDAY comes weekly—and on the spot—for the men who build gas and oil pipelines under Oklahoma Contracting Co. contracts. There is no chance for pay checks to be delayed in transit from a central accounting department. The checks and all supporting payroll documents—even a complete cost breakdown—are prepared in the field office of each "spread" of pipeline-construction operations.

It Is Not "Extravagant"

This may seem to indicate an extravagant investment in field-office equipment and personnel, and as a matter of fact, the whole industry of pipeline transmission of gas and oil looks like extravagance. But in reality this is so only in the scope of operations, and even that is relative. Long-distance transmission of crude oil by pipe and booster station was in practice back in the early 'teens when the Oklahoma Contracting Co. was founded. Since then, the company has had wide experience both at home and abroad. The owner of a proposed pipeline—either a natural-gas or an oil company—furnishes the right-of-ways and all materials for the project. Oklahoma Contracting does the actual construction, providing all the necessary field equipment and personnel.

It is probably largely due to the development and constant improvement of such heavy equipment as bulldozers, ditch diggers, and specialized pipe-laying tractors and machines that the expansion of long-distance pipelines has been made economically possible. The company's main pool of such equipment is now stored in a large yard on a 4-acre tract about 5 miles north of Dallas, Texas. Here also are the warehouse, machine shop, and the modern one-story building which houses the general offices.

Field-Office Organization

Of the company's present 2,000 personnel, only about 30 or 35 are in the home office. All others are in the field, the major portion in actual construction work. Each field office is manned by a paymaster, one or two timekeepers, one or two time checkers, a purchasing agent and, if necessary, a typist.

Each office lists among its responsibilities the compilation of weekly payroll and check registers, the preparation of pay checks, a weekly breakdown of payroll and equipment costs, and a daily report of manhours worked. Among other routine office chores in the field is the checking of extensions on all invoices from vendors from whom the local purchasing agency buys supplies and repair parts.

Calculating Machines

In these offices, as in the "spread" itself, efficient equipment is the source of efficient operations. Each field office is equipped with a Remington Rand printing calculator, which serves the double purpose of a calculator and an adding machine. Considering that the roster of the field office does not include a calculating-machine operator, it might be asked how the home office can expect to receive accurate reports on the expenditure of money without centralized control over the accounting operations, which include expert operators. The answer is that these printing calculators, equipped with a 10-key keyboard, are simple to operate. Timekeepers without any previous experience have been able to operate the calculator after a few hours' practice.

The extent to which ease of operation, speed, and accuracy are built into these machines is indicated by the weekly progress and cost reports which are supplied to the home office by the field. These are detailed reports which show a breakdown of the various cost items such as labor, insurance taxes, repair parts, gas, oils, and greases, into 25 possible categories such as right-of-waying, hauling and stringing of pipe, machine ditching, hand-ditching, and so on. There are daily and cumulative totals to be computed, a total to date, and a breakdown of totals to the cost per foot of line to date

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Weekly Pay Checks Prepared in the Field

(Continued from preceding page)

There are cross totals and vertical totals to be balanced.

In other words, field-office accounting operations call on all four functions of adding, subtracting, multiplying, and dividing, much of it in large numbers of as much as 8 or 9 digits. These are accounting functions which are generally associated with home-office or central-office responsibilities. If expert calculating-machine operators were required, Oklahoma Contracting Co. would not be likely to assign these duties where the costs occur. Printing calculators make it possible to assign these tasks to men who are at the scene of construction activities, and the printed tapes enable them to double check every calculation before they release the pay checks or their reports to the home office.

Probably the most important phase of the field-office operation, however, is the fact that construction crews can be paid right on the line. This is particularly true in remote locations, but all along the line efficient equipment in the field and in the offices is the reason why an apparently "extravagant" industry is operated profitably.

Device Splices Rods

A new device for splicing reinforcing rods has been patented by Jerome P. Costello, 3527 Bevis Ave., Cincinnati 7, Ohio. It consists of two

oval rings or yokes that bind the overlapping rods with wedges.

The yokes are slipped over the end of the first rod, and when the second rod has been set in place, the yokes are positioned at the overlap. The shaped and tapered wedges are then driven under the yokes by hammer blows in the direction of the stress in the rod on which they bear. Once in place, stress simply causes the wedges to bind the yokes on the rods and all additional stress serves to bind them still tighter, the inventor points out. Rods clamped in this manner are held firmly in position during the pouring and tamping of concrete; rod overlap is cut as much as 75 per cent; and the clamp takes only seconds to install with no tools other than a hammer.

The patent is offered for immediate sale to any reputable manufacturer.

For further information contact Mr. Costello at the above address or use the Request Card at page 18. Circle No. 581.

Posting Board Shows Progress of Job

A board which tells at a glance the progress of the various phases of a job is made by Graphic Systems, 55 W. 42nd St., New York 18, N. Y. The Boardmaster, which requires a few minutes of posting daily, consists of a 24-inch x 38-inch board with small cards that attach in rows and columns on the board's surface. The cards, on which progress notes are written or typed, come in contrasting colors so that any given operation represented by its own color can be followed without confusion.

The horizontal dimensions of the board can be used to represent the time sequence or progress of a job, while the various phases of the jobs may be listed vertically. The board has 25 columns horizontally and 25 columns vertically, but each of these may be subdivided by special-sized cards. A number of boards may be combined to make a larger system when needed.

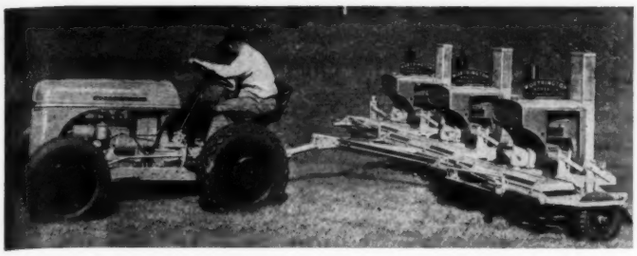
For further information write to the company, or use the Request Card at page 18. Circle No. 591.

Asphalt-Surfacing Iron

A gasoline-heated asphalt surfacing iron is the subject of a folder by Camm Mfg., 1425 First St., San Fernando, Calif. The Surfa-slick, which heats in 10 minutes, has shoes that may be replaced when worn.

The manufacturer stresses the saving in labor costs as the smoother can put all his time on actual surfacing.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 648.



This 3-gang rotary mower cuts a 17-foot swath at 5-mph towing speed. Each unit is powered by a 13.3-hp engine. For further information write to Worthington Mower Co., Stroudsburg, Pa. Or use the Request Card at page 18. Circle No. 626.

Mobile Radio Sets Operate in New Band

Federal Communications Commission approval of mobile and base-station radio equipment for operation in the 460 to 470-frequency band is announced by Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Ill. The action opens new channels to more individuals or commercial enterprises.

Authorization is for Class "A" citizen's band operation within the frequency range from 460 to 462 mc and from 468 to 470 mc. The transmitter final amplifier-power input is limited to 50 watts.

The approved mobile and base-station equipment has many features of the manufacturer's sets operating in the lower-frequency bands. The receiver has the Sensicon circuit with the Permakay filter which is said to give selectivity under all conditions of temperature, humidity, and vibration. It has 21 tubes and 5 tube types for economy in maintenance. The transmitter, with power output of 20 watts, has 9 tubes. Breakaway housing simplifies servicing by making each component accessible. The base-station equipment is a locally controlled unit housed in a desk-top cabinet. A remotely controlled base station in a weatherproof cabinet and suitable for outdoor installation is also available.

For further information write to the company, or use the Request Card at page 18. Circle No. 649.

Industrial-Crane Booklet

An industrial-truck crane that carries loads up to 10,000 pounds is the subject of a catalog by Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg. The Karry Krane has a 5-position adjustable boom.

The manufacturer stresses the unit's mobility and maneuverability. It is pneumatic-tired and has a speed of 10 mph in either direction. Rear-wheel trunnion steering provides a turning radius of 152 inches.

Other features stressed are visibility from the operator's seat, operator comfort, and accessibility of mechanisms for servicing.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 650.

ASA Approves Building Code

"Building Code Requirements for Excavations and Foundations as an American Standard" (A56. 1-1952) received the approval of the American Standards Association in January.

The code consists of minimum requirements for excavations with reference to safety of structure or permanence of foundations, soil-bearing capacities, extent and proportions of footings and foundations, and recommendations for piling and allowable pile loads. It endorses recent trends toward permitting heavier loads, consistent with safety, and requires tests for all pile loads in excess of 15 tons.

A culmination of more than 14 years' work, this code was developed by Committee A56 of the ASA and was sponsored by the American Society of Civil Engineers. Certain of its requirements are based on the findings of a special canvass of municipal law officers conducted by the U. S. Conference of Mayors. An appendix contains explanations, supplementary material, and tables to assist local building-code committees and building officials.

The publication is 80 cents a copy, and may be obtained from the American Standards Association, 70 E. 45th St., New York 17, N. Y., or from the American Society of Civil Engineers, 29 W. 39th St., New York 18, N. Y.

Cement Stabilizes Long Highway Job

Widening Strip Stabilized With Portland Cement; Then A 24-Foot Lane Is Surfaced With Bituminous Concrete

• OUT in Texas, where highway construction is usually done in a big way, U. S. 70 has been rehabilitated all the way across Hale County, a distance of 28 miles, at a contract cost of $700,000. The project called for an interesting piece of widening, with portland-cement stabilized soil and caliche, alongside the 9-inch edge of an old 9-6-6-9 concrete pavement laid in 1929. Cooper & Woodruff and the Tecon Construction Co., both of Dallas, had the contract with the Texas Highway Department. The project was centered on both sides of Plainview (20 miles westward and 8 miles eastward), out in the Panhandle about 70 miles south of Amarillo and north of Lubbock. Started on March 24, 1952, work was completed by last fall.

Design Modernizes Old Road

The constant improvement of U. S. 70 in Texas and other states nearby has pulled considerable heavy transcontinental traffic to this highway in recent years, and the narrow 18-foot concrete slab was becoming dangerous. Fortunately, however, its alignment through the flat-to-gently-rolling terrain was permanent. The old slab had been set on reasonably good subgrade, so the Texas engineers felt that a hot-mix topping, coupled with a sound base widening alongside, would give the road many more years of good service life.

On the south edge of the old concrete slab, for a total length of about 28 miles, 6 inches of the top shoulder material 8 feet wide was graded away and wasted. The next 6 inches of native material, provided its plasticity index was not more than 12, was stabilized with 5 and 7 per cent of portland cement. Material with a PI greater than 12 was removed and replaced with select material, within the right-of-way limits, which met the specifications.

Over the top of this 6-inch course of stabilized native material, a 6-inch cement-stabilized caliche base was placed, with a cement content of 5½ per cent. Along the south edge of the new stabilization a 7-foot caliche shoulder was built, and a 9-foot caliche shoulder constructed along the north edge of the old slab. The 24-foot hot-mix asphaltic-concrete topping covers the entire old 18-foot pavement, plus 6 feet of the stabilized widening strip. It was placed in two courses—a leveling course applied by motor grader, and a riding surface placed by a conventional Barber-Greene asphalt finisher. The leveling course consisted of 90 pounds per square yard; the riding course, 120 pounds.

Engineers connected with the project and local people around Plainview are delighted with the work. In spite of the practical difficulty of placing a new base and surface alongside an existing slab, the job has been done so successfully that no apparent discrepancy or settlement has occurred. And what is even more important, normal traffic was carried through the job daily without accident.

Grading Starts Work

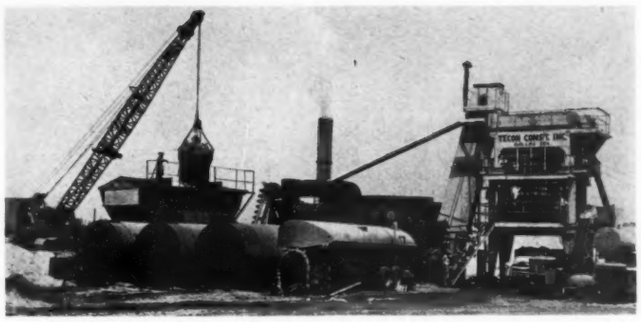
The removal of necessary earthwork called for the excavation of about 133,000 cubic yards of material, all on short hauls. This was quickly roughed out by a fleet of 7 Caterpillar D8's with 12-yard LeTourneau Carryalls. A total of 7 Caterpillar motor graders was also assigned to help out. The bottom of the grade was left generally undisturbed, except in a few hard spots, where it was lightly ripped by the motor-grader scarifiers to make the stabilizer's work a little easier. The

A P&H Single Pass Stabilizer mixes cement and soil in one of the strips on U. S. 70. *Texas Highway Dept. Photo*

job was nicely planned, so that the dirt could be wasted inside the right-of-way limits.

Big Stabilization Job

The new stabilization was one of the biggest soil-cement jobs ever let in western or northern Texas, and counting the two 6-inch courses, it amounted to 56 miles of work. The job was handled by starting the soil stabilization at the west end, working east for 18 miles, then stabilizing the caliche which had been laid to cure the soil cement, then finishing the remaining soil cement, and finally finishing the caliche-base stabilization.



A Bay City crane is charging this Madsen 4,000-pound hot-mix plant, as it turns out material for the new road surface. *Ray Day Photo*

Bulk cement was delivered by railroad in Plainview, and was transferred to a fleet of 6 Ford, International, and Dodge trucks by a Johnson car unloader. Each of the trucks dumped into a Hercules spreader box, which could be adjusted to deliver the proper amount of cement to the subgrade. The high plains country in this part of Texas often has hard winds, so extreme care was used not to get too far ahead of the stabilizer on windy days. The cement usually was placed about 1,000 feet ahead of the stabilizing machine. Each truck hauled about 10,000 pounds of cement per load; about 21,200 barrels of cement were used.

A typical day's work started with the excavation of a small trench 2 feet wide and 8 feet long, to set the stabilizing machine down. This machine was a P&H Single Pass Stabilizer, which has done considerable soil-cement work in other parts of Texas for the company. The P&H was spotted, its hood let down, and it began mixing. In about 10 feet it had attained its full mixing depth, so to get a thorough job on the portion partially mixed the machine was backed up, with its hood down, and started again. When the 10-foot strip was finished, the machine moved on ahead in a single pass, doing a thorough job as it moved along. In soil stabilization, the machine averaged 26 feet per minute. In the caliche-base material it did even better, often doing 32 fpm.

Water was something of a problem on a job this long, and it had to be secured from many sources of supply, principally irrigation ditches and wells along the highway. A fleet of water trucks hauled constantly from these wells, delivering the water to a 2,000-gallon surge tank mounted on wheels. The P&H machine, through a stiff tongue and hitch, shoved this surge tank ahead as it moved along. Moisture samples were taken ahead of the P&H machine on the native material. They proved to be sufficiently constant so the sampling could be discontinued; the material was just mixed to its optimum content with moisture.

All told, the 56 miles of mixing was done on the replacement of only one set of digging teeth and the partial replacement of only a single set of mixing paddles. There was one 5-day delay to operations due to a broken gear, but it was repaired at the Milwaukee plant and sent out to the job by plane.

As soon as the P&H machine moved forward with its work, two 2-drum sheepsfoot rollers pushed by Caterpillar D7 tractors moved up close behind the machine and started the compaction. When a strip about 500 feet long was finished—and this was judged by the way the sheepsfoot rollers "walked out" of the material—a pressure spray passed over and applied a fast shot of additional moisture. A Caterpillar motor grader then moved in to start a tight blading procedure, which worked the surface down level. As it worked, a small Case-drawn pneumatic Bros Wobble Wheel roller went to work, compacting this loose surface material. It was finished down hard and tight in this manner.

In the meantime, a Pioneer crushing and screening plant had been

(*Continued on next page*)

Cement Stabilizes Long Highway Job

(Continued from preceding page)

busy working one caliche pit in Plainview and another 7 miles west and 1 mile north of the city. This was a hard material, so tight in the pit that it had to be drilled, shot, passed through both jaw and roller crushers, and screened to 1½-inch-minus specifications. Meeting PI limits of 15 or less, this material had been dumped along the south edge of the concrete slab in sufficient quantity to spread 6 inches thick. As soon as a section of soil stabilization was finished, this material was shoved out over the newly completed work. After being leveled off, it was sprinkled heavily by water trucks, and allowed to stay that way for about 14 days while the stabilized soil cured and developed strength. Compressive strengths of between 2,000 and 3,000 pounds were recorded on this material, and some even exceeded 3,000 pounds.

This 3-wheel Galion roller worked up fairly close to the Barber-Greene finishing machine to make the initial compaction pass. *Ray Day Photo*

The same equipment and basically the same procedure was used on the stabilization of the caliche base, except that the last application of moisture was followed by an 8-ton rolling with a Galion 3-wheel machine. The stabilized caliche was cured by an application of 0.2 gallon per square yard of RC-2, applied by a 2,000-gallon Littleford distributor.

At the peak of operations, there was a fleet of 65 dump trucks of various makes hauling caliche, the stabilizer was making between 2 and 3 miles of progress a day, and operations were in full swing. The traveling public was being safeguarded by flagmen, by a foolproof system of night flares, and by red warning flags stuck to iron rods along the cut-out slab. Not a single accident marred what could have been a dangerous job if adequate safety precautions had not been scheduled and carried through from the start.

Hot-Mix Topping

The hot-mix surface material met Texas Highway Department standard specifications for typical jobs of this kind. For the leveling course, a Type D material consisting of ⅝-inch-minus aggregate, with about 5.3 per cent of OA-135 asphalt, was used. This mix retained about 55 per cent of the material on the No. 4 screen. For the surface or riding course, a Type C material consisting of ¾-inch-maximum aggregate with about the same No. 4 retained percentage, was used, with the same percentage of OA-135.

The material was batched out of a single unit in Plainview by a Madsen 4,000-pound asphalt plant, set up along the railroad. Sand and aggregates came in by rail from the Amarillo plant of Texas Sand & Gravel Co., and were unloaded by a Bay City clam. After being unloaded, they were stockpiled by a Caterpillar D6-mounted dozer, and charged to the initial cold-compartment feeder by the Bay City crane.

In passing through the plant, the aggregates were first placed in a special cold-compartment feeder, made to Tecon's specifications by Madsen Iron Works. This feeder was tapped by a conveyor belt line, driven by a Chrysler industrial engine, and its 4 bins held about 80 tons of material. The purpose of the cold feed was to make close to the right blend of material to meet the mix specifications, and as this blend of material dropped off the end of the

conveyor, it was picked up by the plant's bucket elevator which carried it up to a 7-foot dryer 24 feet long, driven by a D8800 engine.

Installed also as a part of the dryer component was a dust-collection unit, driven by a Caterpillar D318 diesel. Fines were saved from this unit and returned to the mix. It was such an efficient collection unit that there were no complaints whatever about the plant being set up in the city.

After the mineral aggregate had been dried of its estimated 1 to 2 per cent moisture content, it was routed to a set of Symons screens which made the final classifications and dropped the material down to the bins on the plant. The dryer used natural gas to heat the aggregate. It came in to the plant in a 4-inch line, and was distributed to three Webster burners, under about 45 pounds' pressure.

The dryer was equipped with a kingpin and its own wheels, so that it could easily be hooked onto by a towing tractor and moved over the highway under its own power. The entire plant, incidentally, was highly portable. Tecon used flexible steam and asphalt lines to make setups fast and easy.

Asphalt for the mix originated with Col-Tex Refining Co. of Colorado City, Texas, and was trucked in at pumping temperature. Plant officials reported excellent service from the company. At the plant site there was one double-compartment 8,800-gallon tank which could store RC-2 tack oil and diesel fuel. Two other 8,800-gallon horizontal tanks stored OA-135 asphalt. A 3-inch Viking asphalt pump handled the material to the hot pot. Asphalt heating, pugmill rams, and bin heating were done by a Clayton automatic steam generator, and the main pugmill was driven by a huge Caterpillar D375 diesel engine, which also drove a 60-kw generator. The field-designed pugmill drive consisted of 12 heavy V-belts.

A fleet of 18 Ford and International batch trucks hauled from the plant to the job, and, of course, as the haul lessened the fleet was reduced. About 8 batches could be hauled per load, and it was hot enough during the summer to leave the loads uncovered.

Out at the project, 12-foot strips of the top-course material were laid by a Barber-Greene Finisher. A 1-foot bevel was also made on the south lane at the time the strip was placed. The bottom leveling course was dumped and spread by motor graders. Compaction was done by two rollers—a Galion 3-wheeler, which made the initial knockdown pass, and a Buffalo-Springfield tandem 10-ton rig, which put on the finish compaction. The street paving was more or less conventional. Progress was excellent, and when a C. & E. representative visited the project a 6,000-ton week had just been turned in. The hot plant was turning out about 1,100 tons each day shift.

General Superintendent R. E. Cargile of Tecon Construction Co. at left talks with Resident Engineer H. C. Weaver. They've just finished a 6,000-ton week on the hot-mix.

Ray Day Photo

Definite divisions of responsibility were observed on the job, with Cooper & Woodruff responsible for the grading and stabilization, and Tecon Construction Co. mixing and laying the hot mix.

Personnel

From the contractor's point of view, Cooper & Woodruff were represented by L. L. Cooper and W. B. Woodruff, partners, with M. O. McDowell as General Superintendent. R. E. Cargile headed Tecon work.

The project rehabilitation, which is expected to ease Hale County's traffic condition immensely, was designed and supervised under D. C. Greer, State Highway Engineer. J. A. Waller is Chief Engineer of Construction and Maintenance, with Jed Robinson as Construction Engineer. Hilland C. Weaver supervised field engineering as Resident Engineer, headquartered in Plainview.

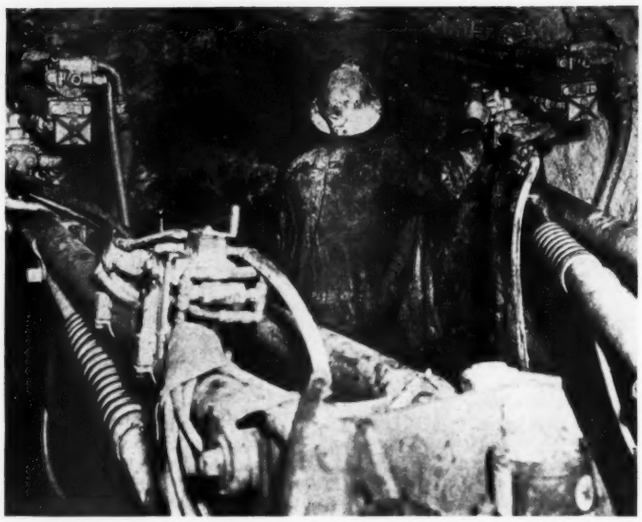
Protective Sleeves

Neoprene sleeves that protect moving parts against chips, dust, water, oil, and heat are available from the A&A Manufacturing Co., 2017 West Clybourn St., Milwaukee 3, Wis. Gortite sleeves are made in round, square, rectangular and triangular shapes in all sizes.

Telescopic sleeves are made for hydraulic connecting rods, rams, guide rods, and steering columns. Boots fit over steering columns, shift levers, and transfer case controls.

The sleeves withstand temperature changes from minus 45 degrees to 220 degrees F, without cracking, according to the manufacturer. They are made to specifications without mold charge.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 651.



Gortite sleeves protect moving parts on these rock drills against dust, water, and heat.

A Laboratory Press For Crushing Tests

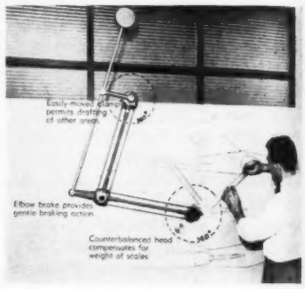
A laboratory press for crushing and breaking tests is available from Fred S. Carver Inc., 1 Chatham Road, Summit, N. J. The press is equipped for crushing tests of standard 2-inch x 2-inch cement cubes, 2-inch x 4-inch cylinders, and similar requirements.

For this work, a swivel bearing plate is provided on the head of the press and a plain bearing plate on the lower platen. The upper plate swivels on a large hardened steel ball. Both plates have circular lines on faces for centering specimens. The gage has a working range from 0 to 20,000 pounds, and the maximum hand indicates directly the total force applied when the specimen breaks. Gages of variable ranges are available.

For further information write to the company, or use the Request Card at page 18. Circle No. 577.

New Drafting Machine

A new counterbalanced vertical drafting machine has been introduced by V & E Mfg., Co., Box 950M, Pasadena 20, Calif. The Vemco machine has an elbow brake which provides a gentle braking action and may be locked or fully released.



The head on which the scales fit is balanced for use with any type of 12-inch (vertical) or 18-inch (horizontal) scale. The counterweight may be adjusted to fit other sizes of scales.

For further information write to the company, or use the Request Card at page 18. Circle No. 652.

Louisiana Highway Booklet

A bulletin sponsored by the Louisiana Department of Highways has recently been published as a record of Louisiana's Third Annual Short Course on Roadside Development. Included in its 90 pages are attendance reports of the meeting beginning March 11, 1952, the program lineup (including a field inspection trip), with detailed accounts of discussions at the various sessions, reprints of speeches, and the makeup of committees and subcommittees. Included among discussion topics were such subjects as public relations; personnel for roadside development; initial establishment of turf on roadsides; trees; right-of-way protection; soil stabilization; and erosion control.

This booklet may be obtained from Torbert Slack, Roadside Development Engineer, Louisiana Department of Highways, Box 4245 Capitol Station, Baton Rouge 4, La., or from H. A. Flanakin, Director, Experiment Station, Louisiana State University, Baton Rouge, La.

HRB Proceedings—1952

The proceedings of the 31st Annual Meeting of the Highway Research Board held in Washington, D. C., on January 15-18, 1952, have again been published in book form by the National Research Council. Under the editorship of Director Fred Burggraf, Executive Assistant W. N. Carey, Jr., and Editor Walter J. Miller, the 690-page book is a compilation of some of the reports and papers, with accompanying photographs and diagrams. Specific headings include: Economics, Finance, and Administration; Design; Materials and Construction; Maintenance; Traffic and Operations; and Soils. There is a listing, too, of papers and reports which are contained in other HRB publications.

The Proceedings are available from the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. The book is priced at $7.50.

New Branch for Gar-Bro

Gar-Bro Mfg. Co., Los Angeles, Calif., has opened branch manufacturing facilities in Peoria, Ill., where the Gar-Bro line, including buckets, power-carts, hoppers, and other concrete-handling equipment will be produced. The new branch is under the personal supervision of Walter F. Dexter, Resident Manager.

New Masonry Drill

Dust packing which causes stalling is said to be overcome by the design of a new masonry drill introduced by Holub Industries, Inc., Sycamore, Ill. The proper combination of oval flutes, narrow lands and fast spiral carries the dust up and out of the hole as fast as it forms, according to the manufacturer.

The Hi-Twist drill is made of alloy steel and has a Carboloy tip, which resists dulling. It can be used for continuous drill of masonry materials as well as soft metals.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 646.

Shovel and Crane Line

A selection of shovels and cranes is shown in a new booklet by The Thew Shovel Co., Lorain, Ohio. Units of varying capacities with crawler and rubber-tired mountings are discussed. Among the construction features stressed are hydraulic coupling and air controls which are found in some of the models.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 653.

Research Building Is Added to Factory

Windowless Reinforced-Concrete Structure With Connecting Passageway to Original Building Doubles Floor Space

• AN interesting trend in construction of business and factory premises is to build them according to designs specially drawn to suit the purpose for which each building will be used. Admittedly, such a plan may be hampered by the difficulty of snipping the cord which connects us to the past. But the Maytag Co., Newton, Iowa, manufacturer of washers and appliances, can be proud of its progress.

Research Building

The company's new Research and Development Building, which doubles the floor space allotted to this division, stands at the side of the present building, and has a connecting passageway, so that both can be used as one. The structure has many new features. It is windowless, and is built entirely of reinforced concrete, thus eliminating steel beams. It has a parking space on a 7-inch-thick concrete-slab roof reached by an easy-drive ramp equipped with heating cables to melt the snow and ice in winter. Executive parking is provided in a basement with a floor slightly above street level for natural draining.

Completion of the building, which contains 10,000 square feet of floor space, is scheduled for July next. It is part of a long-range general building expansion by the company. Another phase recently completed is its large and modern No. 2 factory.

Unusual Features

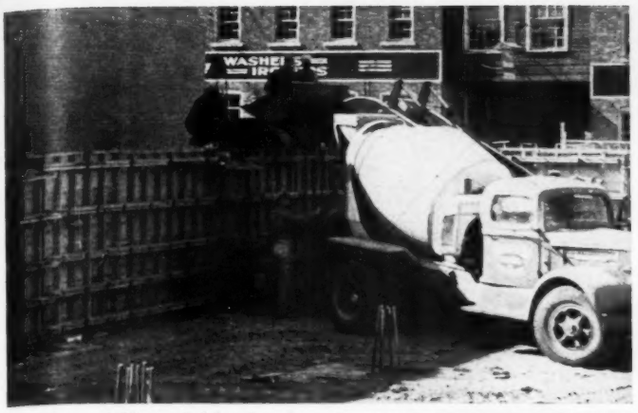
Some of the more interesting and unusual features of the new research building include 10-zone air conditioning, ultra-violet radiation from tubular ceiling-mounted sunlamps, push-button or electronic garage doors in the basement, and heating, ventilating, and cooling-system units located on a mezzanine. The first floor of the new building is 3 feet higher than the same floor on the adjoining old one to the south. The connecting passageway makes it possible to keep the main entrance to the department in its original place in the old building.

The windowless design of the building gives it more usable space, as well as providing more completely controlled ventilation and soundproofing. Fluorescent lighting is used throughout.

Construction

Built entirely of reinforced concrete, the building is 82 x 120 feet. Basement walls are of 13½-inch-thick reinforced concrete—hurricane, tornado and bombproof—with 1-foot 9¼-inch solid masonry walls above. It is thought, too, that the lack of windows and the thickness of the walls may make the building safe from atom-bomb radiation—an important feature should the facilities be used in defense work.

The first-floor slab is 7¼ inches thick and the roof slab 7 inches, both of reinforced concrete. The first-floor and roof slabs are supported on fifteen 16-inch-round drophead columns resting on 7 x 7-foot concrete footings at the basement level. The footing and the



Mounted on a White truck (above), a 3-yard Challenge transit mixer delivers concrete. In the photo at right, a Drott Skid-Loader raises a load of concrete to dump in the 8-foot-high forms.

round columns were aligned with corresponding pilasters in the walls extending from the wall footings to the roof slab.

The front is trimmed with tan-face brick and stone cornices and plaques are used to accent the brick walls. A. H. Neumann & Bros., Inc., Construction Co., Des Moines, Iowa, is the builder on the project.

Forming

Forming was one of the most important parts of the project and forms were built on the job by a carpenter crew which had a complete power-equipped carpenter shop at its disposal. Most of the production cutting was done on a C. H. & E. heavy-duty table-mounted circular saw.

The wall forms were made with 1 x 12-inch planking on 2 x 4 studs on 16-inch centers. Doubled 2 x 6 wales were spaced at 6, 18, and 24 inches from the bottom. Most panels used on the side and rear walls were 10 feet long and 8 feet high. Front-wall forms were lined with oiled ¼-inch plywood liners to provide a smooth outside finish. Basco form clamps were used with Universal Twist-Tyes.

Steel forms were used for the round columns and the belled drop-heads. The roof-slab forms were supported by adjustable wooden shores.

Concrete

Concrete was delivered to the job in 3-yard Challenge transit mixers mounted on White trucks of the Cooper Coal Co., Newton, Iowa. Concrete was a 6-sack mix. The transit trucks dumped their loads into the 2-yard bucket of a Drott Skid-Loader mounted on a TD-14 International tractor. The Skid-Loader then raised and poured over the 8-foot-high forms. Mall vi-

(Concluded on next page, col. 4)

Small Motor Grader

The latest addition to its line of motor graders has been announced by the Galion Iron Works & Mfg. Co., Galion, Ohio. The Model 503, built like big motor graders, features 4-wheel tandem drive, a box-type high-arched frame, and a 4-inch-square solid steel T drawbar with a ball-and-socket connection to the head block. A direct-drive hydraulic pump supplies power for the controls.

The unit has a 40-hp gasoline engine with a 36.7-hp diesel engine available as optional equipment. The transmission gives four forward speeds of 2.3 to 20.4 mph and a reverse of 4.3 mph. The grader weighs 8,720 pounds and has a blade pressure of 4,975 pounds.

Attachments available include a hydraulic shiftable moldboard that is operated from the cab and has a horizontal travel of 30 inches providing a 45-inch maximum reach in either direction. Snow plow, loader, bulldozer, and windrow eliminators are among other attachments for the unit. The top half of the grader's steel and safety-glass-enclosed cab is removable. Another useful feature is leaning front wheels for greater maneuverability.

For further information write to the company and request leaflet No. 337 or use the Request Card at page 18. Circle No. 621.

Proposed Beltroad for Ore

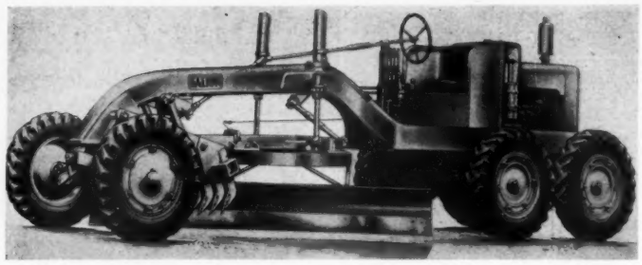
Cleveland, Ohio, is faced with the perennial multimillion dollar problem of keeping the narrow twisting Cuyahoga River open to ore-boat traffic. Realizing that the river is the weakest link in a chain of distribution that moves ore from the Iron Range to Cleveland steel mills, B. F. Goodrich Co., Akron, Ohio, has proposed a solution. It is a rubber conveyor beltroad to take the place of the boats and transport iron ore and limestone from harbor to industrial processors in the Cuyahoga Valley.

After more than a year of studies, engineers of Goodrich believe such a beltroad (4½ miles long) could be built at an estimated cost of $6,000,000 excluding the prices of dock and loading facilities and rights of way. The terrain of the valley is said to be ideal for such a conveyor system and the belt could accept iron ore and limestone directly from ships docking at new waterfront facilities while cargoes could also be unloaded into a stockpiling area at the same location. The main beltroad would provide a smooth continuous flow of materials from lakefront to steel plants. Spur lines would carry materials from the main beltroad to the stockpiles of individual industrial users. Among the advantages the company cites are relief of traffic congestion and smoke reduction.

Concrete Joist-Floor Pans

A booklet on removable pans for concrete joist-floor construction is available from Gateway Erectors, Inc., 3233 W. Grand Ave., Chicago 51, Ill. It gives details for using the company's two types of forms.

Nail-down pans are nailed directly to open centering and are removed when all the shores, stringers, and soffits are taken down.



The Model 503 Galion weighs only 8,720 pounds, is built like big motor grader.

The Gateway slip-in-type pans are set on open centering to which has been nailed a bearing strip. Wood separators are loosely set between the joints and rest on the bearing strips. The pans are then set on the separators and a 1-inch soffit board is tacked between the metal forms.

To obtain this literature write to the company, or use the Request Card bound in at page 18. Circle No. 598.

Research Building Is Added to Factory

(Continued from preceding page)

brators were used to vibrate the concrete around the steel reinforcing.

Personnel

For A. H. Neumann & Bros., Inc., Clyde Moore was General Superintendent. For the Maytag Co., the building was under the direct supervision of R. K. Wisgerhof, Superintendent of Maintenance and Construction. Basic planning was designed by Tom R. Smith, Maytag's Director of Research and Development.

Remember—Safety Is No Accident!

Traffic-Study Aid

A new traffic-survey instrument that plots a graph showing the relationship between the distance covered by a moving car and the time it takes to cover that distance is being patented by its inventor, Robert M. Youngs, Jr., P. O. Box 564, Bernardsville, N. J. The Traffic Chronograph attaches to the car's speedometer cable. A clock device moves the working stylus along the ordinate while the graph paper moves in the direction of the abscissa. The resultant line traces the distance covered to a scale of ½ mile or ¼ mile to the inch, and the time to a scale of 1 minute per inch.

For further information write to Mr. Youngs, or use the Request Card at page 18. Circle No. 622.

The Gledhill low-pressure roadside sprayer comes in 135 and 235-gallon sizes.

Weed-Control Sprayer

A roadside sprayer for weed control is made by Gledhill Road Machinery Co., Galion, Ohio. Because it employs a low-pressure spray system the danger of causing damage to adjacent crops and gardens is said to be reduced.

The sprayer is a trailer unit that carries facilities for power spraying and chemical-storage tanks. It is available in 135 and 235-gallon sizes. For growth that cannot be reached by the spray boom the company offers a hand boom with 50 feet of hose.

For further information write to the company, or use the Request Card at page 18. Circle No. 553.

HRB to Study Economics of Motor-Vehicle Size, Weight

The Highway Research Board, under the sponsorship of the American Association of State Highway Officials, is planning an extensive research program to determine what types, sizes, and weights of freight-carrying motor vehicles can be balanced with pavements and bridges of appropriate capacities to produce the lowest over-all cost of highway freight transportation. The project, "Economics of Motor-Vehicle Size and Weight", is divided into two phases. First, a study of commodity densities, packaging methods, market units, and transportation tonnages to determine the optimum payloads for commodities important enough to the economy of the United States to be transported at the lowest practical over-all cost. The second phase is to determine the variations in both direct and overhead costs of operating highway freight vehicles, as the sizes and gross weights of the vehicles may be increased. To determine the trend of operating costs, the committee will make a comprehensive study of the statistics and costs of truck combinations of various capacities. It will be necessary to explore private road operations as well as all types of trucking services on public highways. Later on, the relative and actual costs of highways of various load capacities will be studied.

One full-scale test of a series of pavement designs using flexible pavement construction is now under way at Malad, Idaho, under the sponsorship of the Western Association of State Highway Officials (see C. & E., Dec., 1952, pg. 92). The AASHO is planning a full-scale road test in Illinois with flexible and rigid constructed pavements. From these tests, it is expected there can be developed cost data which can be used with information from the other two phases of the committee's project to predict the optimum range of truck sizes and weights that may provide minimum over-all highway-transportation costs in the future.

Ask for Caterpillar Photos

"Yours for the Asking" is the self-explanatory title given by Caterpillar Tractor Co., Peoria, Ill., to its introductory message in a recently published photo-service catalog, "Photos by Caterpillar".

The catalog consists of 40 pages of black-and-white pictures showing Caterpillar equipment on construction, mining, snow-fighting, logging, and other jobs around the world. It is not the catalog alone that is "yours for the asking", but glossy prints of the photographs themselves, as well as others which do not appear in this book. In addition, more than 3,800 Kodachrome transparencies are available on loan and may be kept as long as needed.

The catalog, which contains a form for ordering the photographs, may be obtained by writing to the company. Or use the Request Card at page 18. Circle No. 654.

An H-3 Hydrocrane clears away twisted wreckage from Union Station, Washington, D. C. after a train crash. Washington Terminal Corp. and Steiner Construction Co., Baltimore, Md., patched up the station in 3 days—and in time for the inauguration. *Turner Studio Photo*

Small Truck Crane Helps Get

Railroad Station Repaired On Time After Big Crash

• WITH the President's inauguration only 5 days away, swift action was required to repair the gaping hole in the concourse floor of bustling Union Station in Washington, D. C. On January 15 a fast-moving train had brake trouble on the way into the station, and the locomotive plowed far into the concourse before it broke through the floor. The large train stop at the end of the track was entirely uprooted, and was pushed into the basement.

The Steiner Construction Co. of Baltimore, Md., working with the Washington Terminal Corp., was given 3 days to close in the 150 x 100-foot hole and erase all traces of the accident. With huge throngs scheduled to arrive on Monday, January 19, for the inauguration next day, there could be no delays or inconvenience.

The plan was to clear away the rubble, leave the locomotive where it was in the basement, and build a temporary wood floor over it. Merchants Transfer & Storage Co. was called upon to furnish as many 12 x 12 timbers as possible, for temporary beams and shoring, but such a huge order could not be quickly filled. Fortunately, the U. S. Navy had on hand a large supply which was made available to the contractor and solved the problem.

Then another problem presented itself. The low headroom plus the weakened floor made it impossible to use standard-size cranes to handle the material. Hand labor could do the repair job, but not in three days.

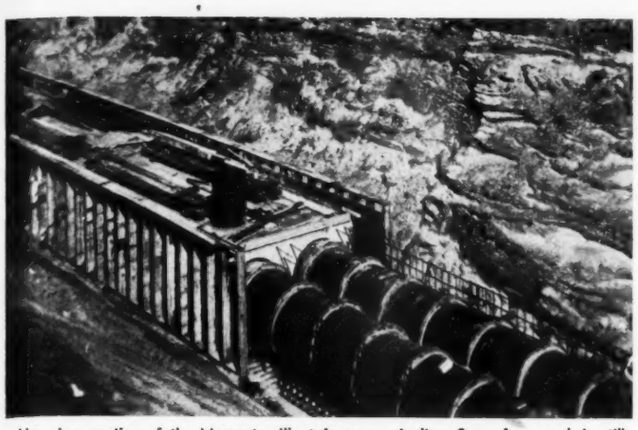
Hydraulic Crane to the Rescue

Merchants Transfer supplied the answer with one of its Bucyrus-Erie H-3 Hydrocranes. The rig cleared away the twisted steel girders, broken pieces of concrete floor, and the loose equipment that lay in the mass of debris. The crane's total weight of 8½ tons, including truck, permitted it to be used close up to the jagged edge of the hole without special support.

The 3-ton lift handled all the wooden planks, beams, and uprights and helped set one heavy steel beam. For this maneuver, a railroad-locomotive crane moved in as close as possible. The operator used his load line to pull up the beam, and the Hydrocrane did the spotting.

The crews worked around the clock and within 72 hours virtually all scars of the crash were removed. The wooden floor was covered with a quick-drying asphalt, the newsstand and station master's office were rebuilt with lumber and the walls painted.

When the thousands of visitors arrived to see the inauguration of the nation's 34th President, traffic was again moving speedily and smoothly through Union Station.



Here is a section of the Monsanto, Ill., twin sewer pipeline. Some form work is still in place, while the exposed pipes, with reinforcing, are all set for forms and concrete.

Lays 2-Pipe Sewer

Monsanto, a little village in Illinois, recently received a 1,350-foot twin industrial sewer. The village is the scene of some of America's heaviest industries, and the sewer had to be capable of meeting the unusual demands put on it by six chemical companies. As the line had to carry weak acids and other chemical wastes, the designer—Architectural Engineers, Inc., East St. Louis, Ill.—specified vitrified-clay pipe as being most resistant to chemical attack. Clay pipe, however, is made no larger than 36 inches in diameter. Since the volume of wastes to be carried by this sewer required more capacity than that, the engineer decided on a dual line of this 36-inch pipe. J. W. Goldenberg was Consulting Engineer.

The contractor, Joseph P. Keeley of East St. Louis, cut a sloping-wall trench, 18 to 22 feet deep, and removed quantities of spoil from the soft and sandy areas. To prevent the pipe from overloading or shifting during backfilling or later, the engineer called for an encasement. Keeley poured a reinforced-concrete cradle at the bottom of the trench, and in laying the parallel lines of pipe on this cradle, he anchored each section of pipe firmly into place with steel strapping hooked into steel eyes embedded in the cradle.

A precast-concrete bulkhead was placed at every fifteenth section to act as an end retaining wall for pouring concrete. Due to the ever-present possibility of rain, which might wash sand under the cradle and around the pipe, the contractor made frequent short pours.

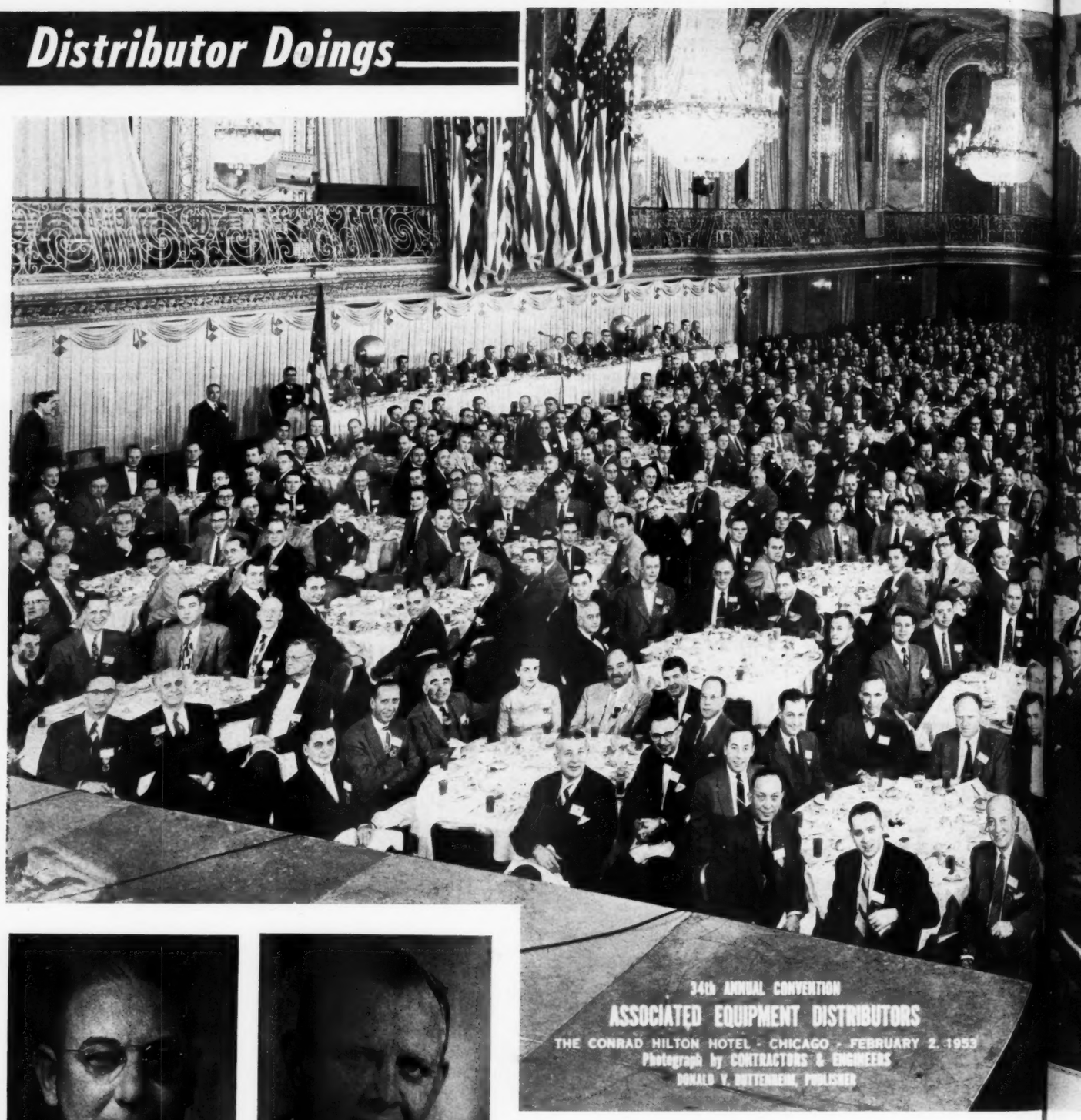
After every few feet of pipe joints had been sealed, Keeley placed steel reinforcing bars between the two pipelines and along each side. Then plywood forms were erected to make retaining walls along the sides; wet concrete encasement was poured; and the forms were moved intact down the line with block and tackle and used again on the next pour.

Also included in Keeley's contract was a large manhole interceptor. This box structure contains various compartments, with gates between them, allowing parts of the manhole to be put in or out of service as desired.

Shovel-Crane Catalog

A 24-page catalog describing its 51 Series of shovel-cranes has been announced by Link-Belt Speeder Corp., 1201 Sixth St., S. W., Cedar Rapids, Iowa. It covers the complete line of ½-yard shovel-cranes including crawler-mounted LS-51, truck-mounted HC-51, and wheel-mounted MS-51 models. Photographs show the equipment under actual operating conditions. Data included cover the upper machinery, crawler, truck, and wheel-mounted lower mechanisms for each model.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 634.



The 1953 officers of the Associated Equipment Distributors are S. John Oechsle, President, and Frank Skidmore, Vice President. Mr. Oechsle is with Metalweld, Inc., Philadelphia, Pa., Mr. Skidmore with Contractors Equipment & Supply Co., Albuquerque, N. Mex.

AED Holds Au

• UNLIKE last year, when governmental controls by the Office of Price Stabilization were practically the theme of the convention, the 1953 meeting of the Associated Equipment Distributors was devoted mainly to problems within the Association. Over 2,600 leading distributors and manufacturers of construction machinery, from the United States and Canada, gathered at the Conrad Hilton Hotel in Chicago from February 1 to 5 for the 34th Annual Meeting of the AED. Business sessions were slanted toward such topics as management practices of its members, and manufacture-distributor relations, rather than toward Federal regulations, which greatly concerned the 1952 gathering.

For the most part the delegates seemed satisfied with the results of the last election, but felt that the attention of the new Administration in Washington should be directed to what might result should surplus heavy-construction machinery be released upon the domestic market at the close of current hostilities in Korea. This cause for concern stemmed from the vast quantities of

Bill Kingman,
Illinois Contractors
Machinery Inc.,
Melrose Park, Ill.

(See photo below)

E. H. Kleibenstein,
Ridgewood, N. J.

ds ual Meeting

equipment that have been purchased by various agencies of the Federal government for overseas use since the outbreak of the Korean war.

The convention delegates feared a possible dislocation in the economy should this equipment be released suddenly and ill-advisedly, and urged that immediate steps be taken to provide for the disposal of construction machinery in order not to disrupt the economic stability of the country. To that effect a resolution was adopted recommending the development of basic principles to govern the return of surplus construction machinery.

As with previous AED conventions, the basic purpose was to provide a common meeting ground for manufacturers and their distributors. To this end, the afternoon session on the opening day in the grand ballroom of the hotel was given over to general intermingling of the two groups—manufacturers and dealers. Half of each succeeding day was allocated to individual conferences at the hotel headquarters of the parties concerned. Business sessions of the association as a

(Concluded on next page)

"Zipp" at work in C. & E. suite at the AED convention drawing a caricature of R. A. Studer, of Studer Tractor & Equipment Co., Casper, Wyo. Drawing is center one above.

whole accounted for the remainder of the convention time.

At the first of these general sessions, Harry J. Hush, the outgoing president (Griffin Equipment Corp., New York City), presented a report covering the work of the AED during the past year. This was followed by reports from the Treasurer, Executive Secretary P. D. Hermann, and Field Secretary Jack Randle. The latter stated that he traveled 73,573 miles during 1952 in his AED work, visiting seven provinces in Canada and all but three states in this country. In addition to his wide convention coverage, Randle also called on 465 distributors out of some 1,100 AED members.

In his report, the Field Secretary said that he observed a constant increase by dealers in the use of business machines, and the addition to their staffs of inventory comptrollers. The latter are trained and experienced shop men who have been promoted into sales departments for the exclusive purpose of selling repairs. They instruct equipment operators and mechanics in the all-important techniques of preventive maintenance.

For long and meritorious service in behalf of the association, the AED presented a plaque to one of its members—Past President Harry W. Fletcher of Fletcher Equipment & Supplies, Inc., New Orleans, La.

Speaker Highlights

The discussion of management practices opened with a report by Charles Reitell, partner in the management engineering firm of Stevenson, Jordan & Harrison of New York City. The report is based on information uncovered through a series of personally conducted interviews with distributors throughout the country, and on the results of an extensive survey by mail. Only principals of distributor companies were admitted to the session at which the report was given.

Also on the subject of management practices, Sidney D. Maddock, president of C. I. T. Corporation of New York City, industrial financing, spoke on "Speeding Dollar Turnover". Maddock covered current financing practices, and explained the significance of several changes in financing procedures that have taken place in recent years.

Joseph T. King, AED Washington representative, offered an analysis of past and anticipated Government activities. Frank Mikirk, University of California, addressed one of the general sessions on the topic "Science and Construction". The speaker has been active in founding the university's course in construction-equipment operation. At another session a panel discussion covering training and education was presented by three manufacturers and three distributors.

Luncheon guest speakers included Clarence Manion, former Dean of the University of Notre Dame College of Law, and Gen. Carlos P. Romulo, Philippine Ambassador to the United States. Gen. Romulo made a plea for better understanding of the United Nations, to which he is a delegate of his country.

1953 Officers

AED officers elected for the coming year include: President—S. John Oechsle, Metalweld Inc., Philadelphia, Pa.; Exec. Vice President—Frank Skidmore, Contractors' Equipment & Supply Co., Albuquerque, N. Mex.; three Vice Presidents—George W. Gagel, Machinery & Supplies Co., Inc., Kansas City, Mo.; Ray J. Finn, The Bode-Finn Co., Cincinnati, Ohio; and J. W. Halls, Consolidated Engines & Machinery Co., Ltd., Montreal, Quebec, Canada; Treasurer—F. J. Fitzpatrick, Parker-Danner Co., Hyde Park, Mass. This year, of the 15 local associations of AED the 7 even-numbered regions elected directors to serve a 2-year term. The new directors are: Region 2—Melvin E. Rupp, Rupp Equipment Co., Buffalo, N. Y.; Region 4—L. C. Basham, West Virginia Tractor & Equipment Co., Charleston, W. Va.; Region 6—Ray J. Finn, The Bode-Finn Co., Cincinnati, Ohio (re-elected); Region 8—S. F. Laskey, Northwestern Equipment Co., Fargo, N. Dak.; Region 10—J. A. Benson, Benson Tractor Co., Houston, Texas (re-elected); Region 12—G. H. Jamison, A. H. Cox & Co., Seattle, Wash.; Region 14—R. E. Corson, Ray Corson Machinery Co., Denver, Colo.

The 1954 AED meeting is scheduled for New York City, followed by Chicago again in 1955, and the west coast in 1956.

Brown Represents Euclid in Iowa

The Euclid Road Machinery Co., Cleveland, Ohio, has recently ap-

Distributor Doings

pointed Herman M. Brown Co., Inc., Des Moines, Iowa, its new distributor in all but 10 southwestern counties of that state.

Ten Dealers for Automatic Devices

Automatic Devices, Inc., St. Louis, Mo., has appointed 10 new distributors for its Adjustomatic scaffold lines. These are: Bauer Industrial Sales, Inc., 683 Lincoln, Worthington, Ohio; Bowles & Edens Supply Co., 603 2nd Ave., Dallas, Texas; Chapman Machinery Co., 210 13th St., Tampa, Fla.; Gierke-Robinson Co., 210 E. River, Davenport, Iowa; Highway Equipment & Supply Co., 21st & N, Lincoln, Nebr.; Montana Powder & Equipment Co., 12 E. Lawrence, Helena, Mont.; Neff-Thomas Machinery Co., 1920 N. W. Miami Court, Miami, Fla.; Richard Equipment Co., 910 Franklin, Waco, Texas; State Machinery & Supply Co., 1005 Meeting, W. Columbia, S. C.; and Texas Contractors Supply Co., 2037 E. Lancaster, Fort Worth, Texas.

Allis-Chalmers Distributors

Roche & Hull, Inc., Baltimore, Md., has been appointed a distributor for Allis-Chalmers pumps in an area that includes: the two southern counties of Delaware; all of Maryland except four western counties; seven northern counties in Virginia; and two eastern counties in West Virginia.

Two other appointments were recently made by Allis-Chalmers. Leo E. Engleson is Sales Representative for A-C's General Machinery Division in Boston, Mass.; and Robert W. Lundquist holds the same position in Newark, N. J.

Buck Equipment Names Two Dealers

Two new distributors were recently appointed by Buck Equipment Corp., Cincinnati, Ohio, producers of concrete and material hoists. R. F. Messina Co., Inc., 1411 S. Broad St., New Orleans 15, La., is the new representative in the United States; and Alberto Walliser & Cia, Ltd., Correo Aero No. 631, Medellin, Colombia, is a distributor for Buick Equipment in South America.

New Dealer for Gustin-Bacon

Gustin-Bacon Mfg. Co., Kansas City, Mo., has appointed Benjamin-Foster Co., Philadelphia, Pa., its new distributor of Ultralite and Ultrafine glass-fiber insulations.

Achenbach & Butler Co., which has been handling Gustin-Bacon products in the Philadelphia area, will continue to do the contract work with Ultralite and Ultrafine.

Brinker Handles Gradall in Ohio

Brinker Supply Co., 511 W. Town St., Columbus, Ohio, is a new distributor for the Gradall earthmover produced by Warner & Swasey Co., Cleveland, Ohio. The distributor company will handle sales and service of Gradall in 25 central and southern counties of Ohio.

Dayton Is a Carboloy Distributor

Dayton Supply & Tool Co., Inc., Dayton, Ohio, is the first distributor appointed in 1953 by Carboloy, Department of General Electric Co., Detroit, Mich. The dealer will carry the department's entire line of standard tools and blanks, masonry drills, and diamond wheel dressers.

Equipment Dealers—this is your department, so send your news—all about your new plants, new lines handled, new staff appointments.

Fuels and Lubricants

Two rules for good engine performance are to use gasolines commercially available from reputable marketers and to keep engine operation completely within the manufacturer's recommendations and ratings for coolant temperature, fuel-air ratio, timing, and power demands. The use of proper motor oils drained at the right frequency also alleviates or minimizes engine troubles, according to The Texas Co., 135 E. 42nd St., New York 17, N. Y.

The detailed story of "Fuels and Lubricants for the Modern Bus and Truck" is presented in the August and September issues of the company's periodical *Lubrication*.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 593.

New Bridge to Shift Traffic Over River

Work Under Way on Structure that Will Carry U. S. 5 Across Connecticut River Below Springfield, Mass.

By ALBERT C. SMITH, Associate Editor

• CONSTRUCTION of the new South End Bridge across the Connecticut River just below Springfield, Mass., is the first step in an extensive program to eliminate one of the worst bottlenecks in the state.

The City of Springfield is located on the east bank of the river about 8 miles from the Connecticut State line. The bottleneck occurs near the center of the business district where U. S. 5, the main route to the heart of New England, makes a left turn across the river and then continues up along the west bank. In addition to being an important commercial trunk line, the route carries a large percentage of New England vacationers each year. Beginning at the Wilbur Cross Parkway near Hartford, it runs almost due north for several hundred miles along the Connecticut River to the Canadian border.

The new South End Bridge will span the Connecticut River just below Springfield, Mass. Savin Construction Co., E. Hartford, Conn., was substructure contractor. *C. & E. Photo*

The Massachusetts Department of Public Works has plans for a system of divided highways and bridges that will allow travelers to cross the Connecticut River below Springfield, span the Westfield River on the west side, and then unite with the existing Route 5 in West Springfield.

A secondary purpose for building the South End Bridge is to replace the old and very narrow steel-truss bridge which connects the town of Agawam with Springfield. Built back in 1879, the flimsy structure has barely enough room for 2 cars to pass each other, and no walk area.

New Bridge

The new steel truss bridge is under construction about 1,000 feet south of the old one. When completed late this year, it will cross the river in seven spans. The main navigation span is 300 feet wide and the other spans are 225 feet or under. The high banks on each side eliminate the necessity for long and complicated ramps.

The deck will have two 28-foot roadways with a 4-foot median strip. An 8-foot walk on the north side and a 4-foot walk on the south side are provided for pedestrians.

The contractor's floating drill rig is mounted on a pontoon barge.

Based on the high-water mark of the 1936 flood, clearance under the navigation span will be 14 feet and under the other spans 12 feet.

Piles support the 2 concrete abutments and end piers. The four center piers are set directly on rock. The 12 x 119-foot abutment footings are set on 35-foot-long Monotube cast-in-place concrete piles. There are about 8,360 linear feet of these piles.

Footings

Footings of the end piers measure 91 x 22 feet and are 10 feet thick. Steel H-piles 28 feet long on both 4 and 3-foot centers support the piers; piles extend 4 feet into the footing. Approximately 3,600 linear feet of steel piles went into this work.

The pier stems are trapezoidal in cross section with a 12-foot cap and sides sloping ¾ inch in 12 inches. Heights vary, but are generally about 35 feet. The pointed upstream face slope is 4 inches in 12, and the downstream face slope is 1 inch in 12.

Light gray granite facing covers the complete upstream point of each pier. In addition, five courses of facing were placed the full length of the stem at about the water line. Over 14,000 square feet of granite was used.

Piers are protected from underwater scouring by rock fills around the base of the stem. Four feet of overburden is first excavated around each pier. This area extends 17 feet east and west of the stem and 20 feet north and south on the center piers. The edges of this excavation are cut at a 2 to 1 slope with the riverbed. End piers have similar protection, except that the excavation line at the river bank is on a 6 to 1 slope with the bed.

Contractor Moves In

The $939,700 substructure work was awarded to the Savin Construction Corp. of East Hartford, Conn. The contractor moved in early in the spring of 1952 and immediately began to work on the abutments, both of which are on land. The substructure contract is scheduled for completion during the coming spring.

The Monotube piles for the abutment were driven by a No. 1 Vulcan hammer hanging from a Lorain 820 crawler crane. The concrete pile caps were formed with regular wood panels. Plywood was used to form abutment walls. Richmond supplied tie accessories. Forms were oiled before pouring and left on 5 days before stripping.

Looking down inside coffer where granite blocks are being laid. *C. & E. Photo*

Ready-mix concrete was furnished by Valentine Ready Mix & Concrete Services Corp. of Springfield. Darex, an air-entraining agent, was added at the plant. Twenty-two Jaeger mixers mounted on Autocars made the 5-mile haul. Concrete was chuted into a two-yard bottom-dump bucket, working from a Lorain crane.

The neat-looking wall forms showed the superintendent's concern for safety on the job. Wooden knee braces hanging from the Richmond bolts provided support for a catwalk along the wall about 8 feet above ground level. At the top of the form where workmen were handling the concrete bucket, the contractor built a catwalk to provide ample working space around the swinging bucket. This top catwalk was supported by knee braces hanging from the top of the form.

Wood Trestle

Soon after work began on the abutments, the contractor moved out into the water to start pier construction. To get equipment and ma-

(Concluded on next page)

New Bridge to Shift Traffic Over River

(Continued from preceding page)

terials out to each pier he built a wooden trestle out from the east bank along the upstream edge of each pier. The deck was composed of 8 x 8 and 12 x 12 timber flooring supported on steel girders which spanned between bents. The bents were placed between 20 and 50 feet apart. Ten 40-foot wood piles about 12 inches in diameter made up the bent. Eight piles were set in 2 parallel lines of 4 each so that each line supported steel girders on one span. A 12 x 12 cap was used on each line of piles. A batter pile was driven on the upstream and downstream edge of each bent to provide lateral stability.

After the first sections of the trestle were built, 12-inch H-piles were brought out and set near the site of the end pier. This pier and the opposite end pier near the west bank of the river are both supported on piles.

A Manitowoc Speedcrane on pontoons worked a No. 1 Vulcan hammer over all the H-piles. After the piles were driven, steel-sheet piling was brought out and driven along the neat line of the pier footing. Steel wales and braces acted as a guide. About 170 pieces of sheet piling were used to form a cofferdam around each pier.

Most of the excavating inside the dam was done with an air lift. A 10-inch pipe suspended from the floating crane and carrying 2,000 cfm of air, forced the overburden up and expelled it over the side. Compressed air was supplied by two 500-cfm Ingersoll-Rand and two 600-cfm Joy compressors located on the east bank. A 6-inch Naylor pipe with Victaulic couplings carried the compressed air out over the trestle to the pier work.

Underwater Blasting

Foundation work on the four center piers provided special problems. These piers are supported entirely on bedrock and about 1,000 cubic yards had to be blasted out to form a notch for each pier.

The contractor's floating drill rig consisted of steel leads supported by an A-frame, an American winch, a 250-pound-pressure Goulds pump, and a 500-cfm Worthington compressor, all mounted on a pontoon barge. The rig was spotted over the pier site and then anchored. A 6-inch pipe caisson was first jetted down through the overburden to the rock. In hard sections a No. 2 Vulcan hammer was used to drive the caisson. With the 6-inch caisson in place on the rock the holes could be drilled without becoming clogged and jammed. The floating rig proved a good unit for fast underwater drilling.

An Ingersoll-Rand pneumatic hammer suspended in the leads drove drill steel up to 60 feet long. This length was made up of 10 and 20-foot pieces. Regular Timken 4-inch bits did the cutting.

Each footing required about 100 holes, but shots were made for every line of five holes, each 5 feet apart. Twenty pounds of 60 per cent dynamite was used per hole. Regular caps did the firing.

Most of the pier excavation was done with the air lift. Heavy rock was clammed out by the floating Manitowoc.

After the riverbed had been prepared, concrete was placed inside the sheet-pile cell in a continuous tremie pour. Transit-mix trucks drove out on the trestle where they could dump directly into the big 4-yard Blaw-Knox tremie bucket. The floating crane then dropped the bucket to the bottom, and spread the concrete inside the coffer. An air pipe was used on the bucket to release the vacuum. The largest continuous pour was 1,700 yards on pier 5.

The pier stems were poured in 3 lifts, all above water. One Jaeger 6-inch and one Jaeger 8-inch pump dewatered the coffer until the bottom lift had set and the wood forms had been removed. Before the second lift was poured, the granite facing was laid in 4 courses around the complete periphery of the stem. Both stones and mortar tubs were lowered into the coffer by the floating Manitowoc.

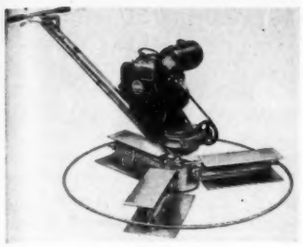
Personnel

C. P. Hartline, Superintendent for the Savin Construction Co., used about 80 men on the substructure.

Resident Engineer for the Massachusetts Department of Public Works was Reuben Barker. The Department is headed by William F. Callahan, Commissioner, and Philip H. Kitfield, Chief Engineer.

Chain Belt Sales Personnel

The Construction Machinery Division of Chain Belt Co., Milwaukee, Wis., announces three personnel changes: Parker Eddy, former salesman for Perkins-Milton, a Rex construction machinery distributor, is named District Sales Manager of the company's office in Los Angeles, Calif.; John Heinrich, who was Sales Engineer for the Pumpcrete Department, is District Sales Manager of Chain Belt's office in Kansas City, Mo.; and Frank Peddar, with 25 years' experience in manufacturing and field service, is Special Sales Engineer for Rex dewatering pumps.



Concrete Finisher

A new rotary concrete finisher with a gyral safety device is announced by Master Vibrator Co., 100 Davis Ave., Dayton 1, Ohio. The device shuts off the Turn-A-Trowel's engine automatically in case the machine gets away from the operator. It may also be used as a grounding switch for stopping the engine when work is completed.

Along with its instant change of rough to finish trowel, Turn-A-Trowel now offers a balanced head which, according to the manufacturer, makes for less effort in operation. The unit comes in 34 or 48-inch sizes.

For further information write to the company, or use the Request Card at page 18. Circle No. 618.

Welder Repairs Track

A folder on an automatic welder and resurfacing unit has been released by the Penn Tool & Machine Co., Danville, Ill. How track links can be reclaimed (without disassembly) is explained in a section on horizontal welding. Rollers, idlers, and sheaves can be welded or resurfaced by circular welding. Pictures and text describe the processes.

This literature may be obtained from Penn. Or use the Request Card at page 18. Circle No. 655.

This 20-yard trailer-dump is announced by Galion Allsteel Body Co., Galion, Ohio. It has two 3-section 7-inch telescopic hoists. For further information write to the company, or use the Request Card at page 18. Circle No. 623.

Adjustable Stairway

A new adjustable stair unit that is intended to eliminate unnecessary hazards normally present in the use of temporary ladders in new construction is announced by Adjustable Stair & Mfg. Co., Box 936, Rockford, Ill. The assembled Adjust-O-Stair can be installed as soon as the stairwell is framed and before the concrete floor is poured. Stringers adjust to heights from 7 feet 6 inches to 8 feet 6 inches, and pitch-and-run from 7 feet 9 inches to 8 feet 9 inches.

The stair is made with steel stringers and wooden treads. Stringers are 12 feet long, and have all necessary hardware for assembling with treads.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 645.

The Dann Express has 3 rollers which act as a single unit. Its turning radius is 8 feet and synchronized power steering turns front and rear rollers simultaneously.

Rigid-Type Roller Concentrates Weight

A new diesel road roller whose three rollers act as a single rigid unit is announced by the Dann Diesel Corp., Empire State Bldg., New York, N. Y. The Dann Express exerts its maximum pressure on the exact surface point where leveling is required. The pressure is 2 to 3 times that of ordinary rollers of equal weight, according to the manufacturer. Model DXR-10 is rated 10 to 13 tons while Model DXR-6 is rated 6½ to 8½ tons.

Despite the fact that it operates as a rigid single unit, when it comes to down-pressure the roller is a true 3-section machine with flexibility of movement. Its turning radius is 8 feet. Synchronized power steering turns front and rear rollers simultaneously, so that all three rollers follow the same track. The middle roller can be raised to operate the machine as a tandem roller. The unit has large single-piece rollers made of cast steel. All three axles extend the full width of the rollers.

The roller is powered by Cummins or General Motors diesels or (for certain overseas territories) by British Ruston & Hornsby diesel engines.

For further information write to the company, or use the Request Card at page 18. Circle No. 575.

Herr Is Marion President

The death of former President J. Malcolm Strelitz caused several changes among the officers of Marion Metal Products Co., Marion, Ohio.

Gilbert E. Herr, former Vice President, becomes President and General Manager. A member of the firm since 1941 and Vice President since 1942, he was recently elected President of the Truck Body and Equipment Association, and Vice President of the Hyraulic Hoist and Steel Body Association.

Other changes in the firm: Joseph L. Halberstein is chairman of the Board of Directors; L. E. Oberlander succeeds him as Secretary; Mrs. Strelitz fills the vacancy on the Board created by her husband's death; R. J. Graham is Treasurer; and R. E. Craven (Chief Engineer) and E. C. Dee are other Board members.

Bridge Lecture Is Recorded, Made Available to Colleges

Dr. D. B. Steinman has presented to the American Society of Civil Engineers a recording of his popular lecture, "Romance of Bridges", together with a duplicate set of the 52 lantern slides (mostly in color) which illustrate the lecture. Dr. Steinman has made this gift in order that the lecture may be available to colleges, engineering groups, and student chapters.

In addition to the set of long-playing phonograph records and the lantern slides, printed copies of "Romance of Bridges" are available.

Those interested in presenting this lecture to engineering students should contact the American Society of Civil Engineers, 33 W. 39th St., New York 18, N. Y.

Buy U. S. Defense Bonds

Convention Calendar

March 16-20—NACE Conference
Ninth Annual Conference, National Association of Corrosion Engineers, Hotel Sherman, Chicago, Ill. A. B. Campbell, Executive Secretary, 1061 M & M Bldg., Houston 2, Texas.

March 17-19—Michigan Highway Conference
Annual Meeting, Michigan Highway Conference, Pantlind Hotel, Grand Rapids, Mich. University of Michigan Extension Service, Ann Arbor, Mich.

March 18-20—New York Highway Engineers
Annual Convention, New York State Association of Highway Engineers, Hotel Statler, Buffalo, N. Y. William Gallancy, Convention Chairman, State Department of Public Works, 65 Court St., Buffalo 2, N. Y.

March 23-25—Surveying and Mapping
Thirteenth Annual Meeting, American Congress on Surveying and Mapping. Shoreham Hotel, Washington, D. C. Murray Y. Poling, Meeting Chairman, U. S. Coast & Geodetic Survey, Washington 25, D. C.

March 23-27—AGC Convention
Thirty-fourth Annual Convention, Associated General Contractors, Miami Auditorium, Miami, Fla. Charlson I. Mehl, Administrative Aide, Munsey Bldg., Washington 4, D. C.

March 24-27—New York Safety Council
Twenty-third Annual Safety Convention and Exposition, Greater New York Safety Council, Hotels Statler and New Yorker, New York, N. Y. Paul F. Stricker, Executive Vice President, 60 E. 42nd St., New York 17, N. Y.

April 6-9—Purdue Road School
Purdue Road School, Memorial Union Bldg., Purdue University, West Lafayette, Ind. Prof. Ben H. Petty, Civil Engineering Bldg., Purdue University, Lafayette, Ind.

April 8-9—Earth-Moving Conference
Annual Conference, Earth-Moving Industry, Hotel Pere Marquette, Peoria, Ill. Harlow H. Piper, Engineering Dept., Caterpillar Tractor Co., Peoria, Ill.

April 10-11—Michigan Engineering Meeting
Annual Meeting, Michigan Engineering Society, Kellogg Center Hotel, Michigan State College, East Lansing, Mich. Joseph E. Wilbur, Executive Secretary, P. O. Box 573, Kalamazoo, Mich.

April 13-15—Lubrication Engineers
Annual Meeting and Lubrication Exhibit American Society of Lubrication Engineers, Hotel Statler, Boston, Mass. William P. Youngclaus, Jr., Administrative Secretary, 343 S. Dearborn, Chicago 4, Ill.

April 13-15—South Dakota Short Course
South Dakota Highway Short Course, Student Union Bldg., South Dakota State College, Brookings, S. Dak. Prof. Emory E. Johnson, Civil Engineering Dept., State College Station, S. Dak.

April 22-23—Institute of Steel Construction
Fifth Annual National Engineering Conference, American Institute of Steel Construction, Detroit Engineering Society Bldg., 100 Farnsworth Ave., Detroit, Mich.

April 28-30—Wood Preservers' Convention
Annual Convention, American Wood Preservers' Association, Cleveland Hotel, Cleveland, Ohio. Harry J. Schulte, Hotel Committee Chairman, 20106 Kinsman Road, Cleveland 22, Ohio.

May 18-22—Material-Handling Show
Fifth National Material Handling Institute Exposition, Convention Hall, Philadelphia, Pa. Exposition Management: Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

June 15-19—ASCE Meeting
Summer Meeting, American Society of Civil Engineers, Casablanca Hotel, Miami, Fla., Don P. Reynolds, Asst. to Secy., 33 W. 39th St., New York, N. Y.

Two New HRB Bulletins

The Highway Research Board has published two reports in response to the recurring highway problems of how to stop safely along the highway in open country and how to cut expenditures on adequate pavement-marking materials.

The first publication, "Parking Turnouts and Rest Areas" (Special Report 7), is the result of thorough studies—on highways in some 27 states, in engineering literature, and in plans and estimates submitted for highway construction. It discusses the need for turnout and rest areas on highways; what to consider in selecting and acquiring the sites for them; and some basic principles of their design, construction, and maintenance.

"Pavement-Marking Materials" (HRB Bulletin 57) contains ten papers dealing with the development of tests, procedures, formulations, and specifications of traffic paints as used throughout the country.

Both bulletins are available from the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. Special Report 7 is priced at 75 cents; Bulletin 57 at $1.80.

Army Tests Power Tools

Some day power tools may function in forward areas of combat zones if a certain set passes the severe military tests it is now undergoing at the Engineer Research and Development Laboratories, Fort Belvoir, Va.

This set of high-cycle electric power tools was constructed to provide an effective supplement to hand and pneumatic tools formerly used in World War II. It is transportable on a ¼-ton trailer, may be dropped from a plane to troops at the front, and may be repaired or replaced easily because all tools are driven by standard Army engines. The set consists of 2 chain saws, 2 circular saws, one ¼-inch and one 1¼-inch-capacity drill, 2 impact wrenches, a grinder, an electric hammer, floodlights, a 180-cycle 220-volt 3-phase 2½-kw engine generator, and various accessories.

The united efforts of power-tool manufacturers and Army research engineers are responsible for the design of this 1,370-pound set and trailer combination which, so far, has passed successfully rigid tests in Europe and Korea. In the latter, it has been used to construct bunkers, assemble bolted-steel fuel-storage tanks, and on numerous other jobs.

Pamphlet on Compressed Air

A new 36-page pamphlet with 63 illustrations has been released by the Committee of Engineering Education of the Compressed Air and Gas Institute, Cleveland, Ohio. It is the third in a series of engineering studies and is directed to designers, engineers and production men in industrial plants. "Compressed Air Power in Industrial Production" discusses pneumatic tools and other aids to production and shows the many uses of compressed air.

The pamphlet, punched for standard 3-ring binders, may be obtained for 25 cents from Compressed Air and Gas Institute, 1410 Terminal Tower, Cleveland 13, Ohio.

A New Truck Crane

A ⅜-yard truck-mounted shovel-crane, providing 20 per cent more lifting capacity than previous Bantam models, has been announced by the Schield Bantam Co., Waverly, Iowa. Rated at a capacity of 6 tons, the Model T-35 comes with a complete line of matching attachments, including shovel, clamshell, dragline, backhoe, magnet, wood grapple, and pile driver.

The T-35 comprises major improvements over the previous Bantam Model M-49. According to the manufacturer, some results of these improvements are: allowance for almost twice as much radial load on the shaft; smoother faster clutching action; extra braking safety and better load-handling accuracy; 37.8 per cent more operator visibility for ordinary work, due to streamlining of the basic-unit cab; and better ventilation for the operator.

The Schield-Bantam heavy-duty Model T-35 crane has a 6-ton capacity.

For further information write to the company, or use the Request Card at page 18. Circle No. 625.

Statically Indeterminate Structures—Two New Books

Two recent publications have appeared with practically the same title. "Statically Indeterminate Structures", by Chu-Kai Wang, Associate Professor of Civil Engineering at the University of Colorado, is published by McGraw-Hill Book Co., New York, N. Y. "Statically Indeterminate Structures . . . Their Analysis and Design", by Paul Andersen, Ph. D., of the University of Minnesota, appears under the imprint of The Ronald Press Co., also of New York City. Both books are priced at $7.50.

Professor Wang's book is intended for the senior and first-year graduate student in civil engineering. Though the treatment is simple, it is extremely thorough and includes illustrative problems worked out in detail, together with exercises. Methods of analyzing statically indeterminate structures and of finding deflections in beams, rigid frames and trusses, are some of the subjects treated in detail, with numerous diagrams and tables.

Professor Andersen's book is prepared for use both by senior students and by practicing engineers. Not confined to the theorems of analysis, the book associates structural analysis with design and analyzes a variety of actual structures rather than considering hypothetical rigid frames. There are photographic illustrations as well as tables and diagrams.

Clamshell Buckets

A new line of clamshell buckets is announced by the Yaun Mfg. Co., P. O. Box 1508, Baton Rouge, La. The buckets, which come in three models, have a manganese-steel cutting edge and teeth of cast manganese.

The closing sheaves are held in alignment by preset welded upper and lower sheave blocks, the lower sheave permanently welded in skewed position. Corner arms are permanently welded into the upper block on one side and rigidly hinged on the other. The upper block can accommodate a 2, 4, or 6-part line. The buckets have a single center shaft extending the full width of the bucket for permanent scoop alignment. Sizes range from ¼ to 2½ cubic yards.

For further information write to the company, or use the Request Card at page 18. Circle No. 629.

Mix-in-Place Machine Speeds Surfacing Job

Mixes and Lays 22-Foot-Wide Bituminous Surface Course For Highway-Relocation Work in Southern Vermont

A Hetherington & Berner Moto-Paver lays a 3-inch-thick crushed-gravel mixed-in-place surface course on Route 30 in Vermont. The Lambert Construction Co. was the contractor.

• VACATIONERS traveling across that part of the state border that separates New York's Lake George area and southern Vermont should find the going somewhat smoother this year. As part of its Federal-Aid highway program, the Vermont State Highway Department last fall relocated and rebuilt about 4½ miles of Route 30 near the town of Pawlet.

The plans called for relocating 1½ miles and replacing about 3½ miles of the old gravel road with 2½ inches of 22-foot-wide mixed-in-place pavement on compacted gravel. Shoulders are 8 feet wide with a slope of ½ inch to the foot. Gravel subbase varied from 18 to 36 inches thick and was carried out to the edge of the embankment on both sides. The 3-foot courses of subbase were used in cuts where the subgrade was clay.

Contractor Moves In

The Lambert Construction Co., White River Junction, Vt., moved in on the $300,000 job in November, 1951, and began drainage work. Over 3,000 linear feet of reinforced-concrete pipe from 12 to 72 inches in diameter was called for. Five 60-inch concrete-pipe cattle passes were also required.

Work was suspended during the winter and started again in April. The contractor first set out to remove a 6,000-yard rock ledge. One Joy wagon drill supplied with air from a 315-cfm Ingersoll-Rand compressor did all the drilling. About 125 holes on 4-foot centers were drilled with regular I-R bits for each shot. American Cyanamid 40 per cent dynamite with standard caps shot the 12-foot lifts of slate rock. About a pound of dynamite was used per cubic yard of excavation.

Rock was excavated with a 1¾-yard Lorain and loaded into an Athey side-dump pulled by a Caterpillar DW10. Common excavation, which totaled over 70,000 cubic yards, was loaded by the Lorain and also by a Byers ¾-yard shovel. About 28,000 yards was also taken from a borrow pit adjacent to the job. Fifteen 5-yard trucks did the hauling. When conditions permitted, a LeTourneau 12-yard scraper pulled by a Cat D8 made hauls of about 600 feet. Two D8's spread and compacted the 1-foot lifts.

Embankment Slips

The process of building up the embankments, however, was not completed until the contractor had worked his way out of a few emergencies. As one particular side-hill embankment was just about up to grade, it began to slip. A clay layer, which was nearer the surface than had been expected, moved under the great load of fill.

To prevent further slippage, the engineer made two changes in the plans. He lowered the grade 5 feet to reduce the weight of the embankment and increased the outside slope. Formerly 2 to 1, he made it 3 to 1. The flatter slope, however, added

(Continued on next page)

Mix-in-Place Machine Speeds Surfacing Job

(Continued from preceding page)

another problem. A small brook at the bottom of the hill had to be relocated away from the slope. Realizing that the old stream bed would provide an excellent drainage area under the new slope, the engineer had a 6-inch Armco perforated pipe laid in the bottom and embedded in over 10,000 yards of gravel. Then the 3 to 1 slope was built up on top. These steps kept the brook a safe distance from the toe, provided good drainage under the flat slope, and prevented future slipping.

Subbase

Gravel subbase totaled about 55,000 cubic yards. Shovels and trucks worked in 4 pits, all of which were adjacent to the job. A D8 dozer and Galion grader spread the gravel, and compaction was achieved with a 10-ton 3-wheel Hercules roller. When the subbase was shaped and rolled, it was tack-coated with ⅓ gallon per square yard of RT-5 tar. A Littleford distributor did the job in two 12-foot passes. Trucks with Buckeye spreaders covered the tar with sand.

A closeup of the H & B Moto-Paver on the Vermont surfacing job.

The 3-inch-thick crushed-gravel mixed-in-place surface course with RC-3 cutback asphalt was laid by a Hetherington & Berner Moto-Paver. The unit covered the surface in two 11-foot passes and averaged close to a mile per day. The aggregate was dumped directly from trucks into the front hopper, where a bucket elevator picked it up and carried it to a feed hopper. A roll feeder below the hopper controlled the flow of aggregate to the mixer, into which the asphalt was sprayed. After complete mixing in the pugmill, the material was spread and struck off. About 15 gallons of RC-3 asphalt was used per cubic yard of mix.

The crushed-gravel aggregate was graded as follows:

Stone Size	Per Cent Passing
1¼-inch	100
1½-inch	95-100
¾-inch	25-35
No. 4	0-5

Asphalt was brought in by tank truck and stored in a 10,000-gallon tank in West Pawlet, about 4 miles from the job. A Littleford oil-burning steam heater kept the asphalt at 220 degrees F. A 1,600-gallon Littleford distributor carried asphalt from the storage tank to the Moto-Paver.

The mixed-in-place course was rolled with a 3-axle 12-ton Buffalo-Springfield roller, and then left for 3 days. After this, peastone was spread on and broomed.

Surface Seal

To give a smooth seal to the pavement, a double treatment of 0.2 gallons per square yard of asphalt with peastone cover was added. Each treatment was broomed and rolled. Vermont specifications on peastone are:

Stone Size	Per Cent Passing
¾-inch	100
⅝-inch	95-1000
No. 4	0-5

The gravel shoulder was laid with an Apsco spreader and rolled.

Because no detour roads were available in the thinly settled area, traffic had to be maintained during construction. The problem was particularly annoying during the summer, because the dry season had converted all roads into thick mats of dust. The contractor kept 2 Dodge trucks, each mounting 1,000-gallon tanks, busy all summer spreading water. Over 1,000,000

gallons were used on the job.

Mix-in-place work was completed by the first week in October and the entire job by November.

Quantities and Personnel

Major quantities on the 5-mile job were as follows:

Common excavation	78,000 cu. yds.
Rock excavation	7,000 cu. yds.
Borrow	28,000 cu. yds.
Gravel subbase	55,000 cu. yds.
Refined tar	21,000 gals.
Cutback asphalt	79,000 gals.
Crushed gravel mix-in-place	10,000 tons

Darrell Lambert, Superintendent for Lambert Construction Co., used about 36 men on the job. Alexander Graham was Resident Engineer and Kenneth Eastman was Inspector for the Vermont State Highway Department, which is headed by Hubert Sargent, Chief Engineer.

Model Tested for Blast

Will the building collapse? In the light of what is known about atomic and hydrogen bombs, this is the question engineers in the building field are asking today. Professor Lydik S. Jacobsen, head of the Mechanical Engineering Department, Stanford University, Calif., and Dr. Robert S. Ayre, now at Johns Hopkins University, are two authorities seeking the possible answers to this question.

In Stanford's Vibration Research Laboratory, directed by Dr. Jacobsen, the two professors have constructed a model 4-story building which is daily blasted into twisted wreckage. But the ingenious model is, in fact, indestructible. Push it up again and it's as good as new. It consists of four metal rectangles placed atop each other, surrounded by rings, rods, and gages, and is 4 feet tall. On this model Drs. Ayre and Jacobsen are testing the mechanical behavior of various buildings hit by different intensities of bomb explosions.

Blast effects come from nine air-driven pistons, four on each side and one on top. They are timed electrically so that all four on the side where the simulated bomb explodes push against the model simultaneously. A split second later the top piston presses down on the roof. Then, from top to bottom, at four additional split-second intervals, the pistons push against the opposite side. This is exactly how a bomb blast would exert pressure against the building—on all sides in quick succession. The intensity of the blast, the nearness of the building to the center of the explosion, and the strength of the building determine how battered and ruined the model is.

Accuracy is the keynote. Air-pressure valves and timing devices regulate the blast effect; springs coupled with circular friction brakes account for the building's flexibility as well as its final deformity. Data are recorded by ring dynamometers and other devices incorporated into the model.

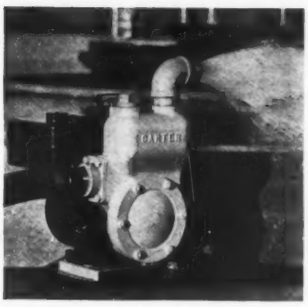
Dr. Jacobsen, who is an expert on the effects of earthquakes and other vibrations, is well known for his contributions to building safety and improvement of building codes in the west. The Jacobsen-Ayre project is supported by grants from the Office of Naval Research.

Help Fight Polio
Join the March of Dimes

Centrifugal Pumps

A new line of self-priming centrifugal pumps is announced by the Ralph B. Carter Co., Hackensack, N. J. The latest Humdinger pumps have twin coaxial volute passages that are said to give greater capacity, faster priming and more trash-handling ability than previous models.

Wear and mechanical power loss are reduced, according to the manufacturer, as the only components inside the volute case are the impeller and the seal. An adjustment that compensates for impeller wear can be made without disassembly or replacement of any part.



The pumps come in sizes of 1½ to 10 inches with capacities up to 250,000 gph.

For further information write to the company, or use the Request Card at page 18. Circle No. 614.

Maintenance-Products Data

A folder on its line of building-maintenance products has been issued by the Maintenance Engineering Co., 16 W. Johnson St., Philadelphia 44, Pa. Among the items described are: a resurfacer for concrete, wood, brick, and asphalt flooring; a crystal chemical compound that gives concrete a hard abrasive resistant finish; an acid-proof coating; and a wetwall paint.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 656.

Truck Line for 1953 Offers Versatility

The 1953 International line of light, medium, and heavy-duty motor trucks with gross vehicle weight ratings up to 90,000 pounds is announced by International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. Aiming at truck-to-job specialization, the line offers 29 engines with horsepower ratings ranging from 100 to 356 and a wide selection of transmissions, auxiliary transmissions, axles, and axle ratios.

Among new features reported on certain models are duplex-valve-type shock absorbers, visible-flow carburetors with fast-idle cam, downdraft carburetion, improved hydraulic brakes, and optional air brakes. Other improvements include increased-capacity universal joints, stronger rear-axle pinion bearing shaft, relocated fuel tank and filler spout to accommodate specialized skirted bodies, new steering knuckle spindles and strengthened engine front-support brackets.

The RF 212 Loadstar is one of International's heavy-duty 6-wheelers.

The heavy-duty truck models include 4 and 6-wheel conventional and cab-forward types for highway and off-highway service. The RF 212 Loadstar with a gross vehicle weight of 45,000 pounds has a 162-hp Super Red Diamond engine which is available with a gasoline or LPG fuel system. Model R-184 has a 142-inch wheelbase with a 4-yard dump body. Standard engine is the 130-hp Black Diamond 282.

For light-duty low-platform dump truck operations, the company offers 1½-yard dump body on 134-inch wheelbase models. Other smaller units are an all-steel pick-up body available in 6½, 8, and 9-foot body lengths; a service-utility body for on-the-job repair work; and the Travelall which is said to carry eight people comfortably. The center and rear seats remove.

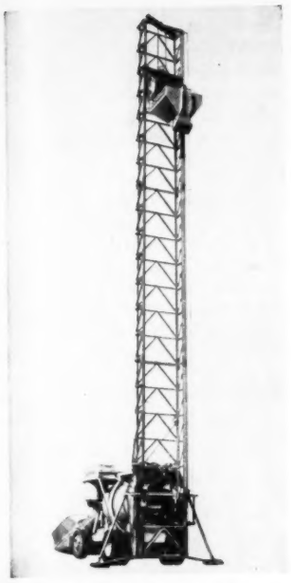
The truck line is now identified by the I-H emblem which has replaced the triple diamond.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 636.

Tire-Relugging Folder

A folder on the relugging of worn tires has been issued by the American Tire Machinery Co., 718 S. Elliott St., Muncie, Ind. Vacu-Lugs cured to worn tires are shown on earthmovers, dump trucks and tractors. The company states that Vacu-Lug shops over the country are equipped to make repairs of all types including sectional, reinforcement, and spot repairs for bad cuts and scuffs.

This literature may be obtained from the company, or by using the Request Card at page 18. Circle No. 657.



Tower Attachment For Concrete Mixer

A new portable tower attachment for the Koehring 16-E Twinbatch mixer enables concrete to be discharged up to 48 feet above ground level. The complete attachment consists of the tower, a 40-cubic-foot hopper, and a 21½-cubic-foot concrete bucket.

With the tower the Twinbatch can mix and distribute up to 50 cubic yards of concrete per hour, and as the tower can be moved frequently on the same job location it reduces the amount of concrete hauling necessary.

In operation, the hopper remains at a stationary level, while the hoist bucket travels up and down delivering concrete from the mixing drum and discharging it into the hopper. The clam-type discharge gate on the tower is manually operated and extends 4½ feet away from the tower. The hopper may be placed at any 6-inch increment along the tower and will face in any of three directions.

The tower comes in 40 and 60-foot lengths. It is raised and lowered by hydraulic rams. The attachment is optional and interchangeable with the 16-E's elevating boom.

For further information write to Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis., or use the Request Card at page 18. Circle No. 572.

Irrigation Job in Haiti

Approximately 110,000 acres of land will be irrigated in the Artibonite River Valley, Haiti, within the next 3 or 4 years, according to a contract signed by Brown & Root, Inc., Houston, Texas, and the Organisme de Developpement de la Vallee de l'Artibonite, an agency of the Haitian Government.

Work has started on the construction of canals and a 1,500-foot dam on the upper reaches of the river in the vicinity of Las Cohovas, near the boundary of the Republic of San Domingo.

The engineer for the Haitian Government on the $15,000,000 project is Knappen-Tippets-Abbett-McCarthy of New York. Howard Payne, Houston, Texas, is Project Superintendent for Brown & Root.

Open-Web Steel Joists

The latest edition of the design manual for open-web steel-joist construction, prepared by the Steel Joist Institute, 1346 Connecticut Ave., N. W., Washington, D. C., is now available.

In addition to standard specifications for open-web steel joist construction, it includes complete safe-load tables in pounds per linear foot of joist as well as per square foot of floor or roof area.

Full-page plates show the dimensions, sections, and properties of all Institute-approved joists. Recommended building-code regulations, a code of standard practice and recommendations for handling and erecting open-web steel joists, are given.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 565.

Baldwin-Lima News

W. M. Huston has taken over the post of Manager of Engineering of the Lima Division of Baldwin-Lima-Hamilton Corp., Lima, Ohio. The Lima Division manufactures shovels, cranes, and crushers.

E. G. Halby succeeds Mr. Huston as Chief Engineer of Shovels and Cranes and administrative head of the Shovel & Crane Engineering Department.

The company has opened a new district office and warehouse at 1503 Northside Drive, N. W., Atlanta, Ga. This location replaces the office-warehouse at Memphis, Tenn. Fred L. Maus will continue as District Manager of the territory.

Plant-Mix Access Road

Further expansion of the U. S. Naval Air Station at Brunswick, Maine, required the relocation of about 3 miles of access road. The Maine State Highway Commission awarded a $265,000 grading and paving contract for this work last spring to J. R. Cianchette of Pittsfield, Maine. The job consisted of building a 22-foot-wide bituminous-concrete road through a moderately flat area containing some swamp pockets. Both excavation and borrow totaled 20,000 cubic yards. One small ledge with 3,800 yards of rock was also removed.

An Austin-Western motor grader shapes and dresses the shoulders and slopes of a new access road near the U. S. Naval Air Station, Brunswick, Maine. *C. & E. Photo*

The contractor first cleared the area with an International TD-24 dozer. In suitable areas, three LeTourneau scrapers tackled the excavation. A 1¾-yard Lorain worked the rock cuts. Two Chicago-Pneumatic wagon drills supplied with air by a 500-cfm compressor drilled the blast holes with Timken bits. Du Pont 40 per cent dynamite was used.

Common borrow was excavated from a sand pit right on the job. Five Tournatrailers made the 3,000-foot hauls. Gravel for the 18 and 24-inch-thick subbase was excavated with a Lorain Moto-Crane in a pit 7 miles from the job. Fifteen 5-yard trucks did the hauling. Side slopes were 4 to 1 in fills and 1¾ to 1 in rock. An Austin-Western motor grader shaped and dressed the shoulders and slopes.

Subcontractor for the 3-inch-thick bituminous concrete top was W. H. Hinman, Inc., North Anson, Maine. The material was hauled from Hinman's plant in Lisbon and spread with an Adnun paver. A 10-ton Buffalo-Springfield did the rolling.

Eugene Moores was Superintendent for J. R. Cianchette. Paul Mansfield was Resident Engineer for the Maine State Highway Commission, which is headed by Lucius D. Barrows, Chief Engineer.

Tubular Scaffolding Has New Lock Device

Tubular scaffolding that features a new locking device is made by Automatic Devices, Inc., 6107 Bartmer Ave., St. Louis 14, Mo. The lock eliminates loose parts and will not bind or tie up since it does not depend on close-fitting parts, the manufacturer points out.

The Adjustomatic Special is a standard product used either for construction scaffolding or rolling towers. It has no wing nuts, and no bolts. No tools are needed for erection. Other features are the tapered aluminum coupler which is rustproof and is said to eliminate bending, and a double tapered stud that allows the brace to hold the end frame for one-man erection.

For further information write to the company, or use the Request Card at page 18. Circle No. 571.

Adds Two Subsidiary Plants

The Transmission & Gear Co., Dearborn, Mich., has opened two subsidiary plants for increased production facilities for the Deluxe Transo Mixer and Transo Load Master front-end loader.

Transo Products, Inc., located in Dunkirk, Ohio, will produce truck mixers. The slightly larger Coldwater, Mich., subsidiary, Transo Mfg. Co., will manufacture Transo Load Master front-end loaders.

India's Bhakra Dam Soon To Take Shape

Monumental Grouting Job and Deep Rock Foundation Feature Mechanization of 760-Foot Sutlej River Dam

Harvey Slocum, builder of Grand Coulee, Bull Shoals, and other American dams, is currently directing operations on Bhakra Dam for the Government of India. Part of a huge irrigation project, the dam is scheduled for completion in 1959.

• IN Nangal Township, Punjab, India, where five rivers meet in mountainous country not unlike that around Phoenix, Ariz., Bhakra Dam is about ready to rise 760 feet out of the Sutlej River Gorge. Under sponsorship of the Public Works Department, Irrigation Branch, of the State of Punjab, the giant structure is scheduled for 1959 completion to irrigate thousands of new acres to feed India's population. As currently planned, Bhakra Dam will stand between 750 and 760 feet high from foundation bedrock to the crest, and will contain from 4,500,000 to 5,000,000 cubic yards of concrete.

Great names in U. S. dam-building annals are represented at Bhakra. J. I. Savage, principal design engineer of the U. S. Bureau of Reclamation for many years, planned the engineering design in conjunction with famous Indian names like Khosla; Governor Trevidi of Punjab; Chopra; and S. D. Khemgar, General Manager of the Bhakra Project. And one of the all-time great names of dam building—Harvey Slocum—is directing construction under contract to the Indian Government. Slocum, the builder of Grand Coulee, Friant, Bull Shoals, and other U. S. dams, is currently up to his neck in problems of logistics which would stagger the imagination of a dam builder in this country.

On-the-job modifications of design and aggregate locations have, with Slocum's and Savage's blessing, saved the Indian Government at least $25,000,000 in the $125,000,000 project.

Problems All Tough

Practically every problem arises from two factors: (1) India's need for completion of the project as soon as possible to relieve starvation; and (2) the long supply lines necessary to mechanize the job and move materials in to the site. Slocum has often spoken in this country about the desirability of using Indian labor and semi-primitive methods to move the foundation excavation, for example, but the urgency for completion is so great that Bhakra will be mechanized as no dam has ever been in this country. Several U. S.

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India's Bhakra Dam Soon To Take Shape

(Continued from preceding page)

manufacturers have cooperated wholeheartedly to turn out equipment which can be operated safely even by relatively untrained natives.

Indian tradition is so ingrained that holidays leave only 212 working days a year. Bhakra's foundation is bad. It consists of sandstone with clay layers, folded at a 25-degree angle, with layers of claystone. The claystone shows a tendency to squeeze under a superimposed load, so the foundation job will be, to use Slocum's expression, "monumental".

"We'll have to go upstream of the axis and excavate the claystone down to solid sandstone far below, and then backfill the deep hole with concrete", Slocum explained. "The grouting job will be enormous. No subway ever built had a worse grouting condition".

Aggregates for the concrete can be produced at the site, but the nearest cement plant is 100 miles away at Kalka, and a railroad line will have to be used for transportation of this material.

To make matters still more interesting, Sutlej River can very easily overtop the gunite-faced earthen cofferdam which Slocum will throw across the river when two 50-foot diversion tunnels are completed. The river has a minimum normal flow of 5,000 cfs, and flood flows peak at anything between 80,000 and 350,000 cfs. Should a flow that large overtop a cofferdam and get loose in the work area, things might be delayed. For the base of the dam is 300 feet long and 1,200 feet wide, at elevation 940. At crest elevation 1,700, the dam will be 1,700 feet long.

"Unusual Mechanization": Slocum

Of all the dams Slocum has directed, the ne plus ultra in mechanization has come closest to achievement at Bhakra. About 1,000,000 cubic yards of the 4,000,000-yard excavation job can be blown loose by coyote-loading methods, but the remaining material will call for careful drilling, shooting, and loading machinery. Slocum's list of this equipment, which is now either en route or has arrived, includes two of Joy's new rotary air-blast drills; Ingersoll-Rand wagon drills; I-R Jackhamers; and both regular and Carset bits.

When excavation reaches a peak, there will be 50 Euclids; a Bucyrus-Erie 120-B, two 54-B's, and two 38-B's; four Marion 93-M's; 2 Manitowoc 3000's; a 1¾-yard Lorain shovel; one 30-ton and one 45-ton Lorain truck crane; 3 Lorain ¾-yard machines; 4 P&H ¾ to 1½-yard machines; and 40 tractors, including D8's, International TD-24's and Allis-Chalmers HD-20's. All of this equipment will be in new condition when it arrives in India.

Concrete work, a Slocum specialty, will be patterned somewhat along the lines of Grand Coulee Dam, with some similarity also to Bull Shoals methods. Currently under construction at the site are forms, buckets, cement silos and a concrete plant, which are being built to Johnson and Blaw-Knox specifications. Slocum is also directing the construction of Bhakra's own self-powered concrete cars, which with the aid of G-E motors will shuttle back and forth between the plant and dam.

Slocum plans to use two American double-cantilever cranes; 2 American Revolvers; and two 185-foot stifflegs with 180-foot booms patterned after the Friant type. Open trestles will be provided first at elevation 1,360 and then at 1,600 for the second lift. Two such trestles will be used. The upstream trestle will be centered 135 feet downstream from the upper face of the structure, and will be extended to 1,600 feet after the 1,360-foot elevation point is reached. The second trestle, which will have only the one level, will be placed 12 feet lower to allow the double cantilevers to pass without colliding. It will be 325 feet downstream from the first trestle center, and about 500 feet from the downstream end of the spillway bucket. The revolving cranes will be gantry-mounted and used to place the downstream concrete.

Slocum had high praise for engineers of American Hoist & Derrick Co. and General Electric Co. when he was interviewed for CONTRACTORS AND ENGINEERS. According to him, American and G-E both went all out to produce mechanical equipment with every possible construction and safety feature. A system was worked out to make various motors interchangeable, for example, and a swing motor on an American Revolver becomes a rack motor on the double cantilever cranes. All motors are designed for dc current. All crane trucks are interchangeable.

With only 45 "Amerequees"—as American nationals are called—Slocum expects to operate the equipment mostly with previously untrained Indian help. But he has had safety features built into the equipment which is expected to reduce accidents and speed up the work as well. For example, no crane operator can roll a machine off a trestle or pull a bucket of concrete up through a head sheave. There are safety devices on the rigs for automatic prevention of such a disaster.

The limited American crew, however, includes some well known names in the construction business. In addition to Slocum, there will be Bruce Johnson in charge of dam design; Einar Skinnarland on plant design; Fred Crocker as office engineer; Joe Estes on mechanical supervision; Ed Shipp from Bull Shoals Dam on concrete placement; and C. W. Norris and Chris Neilsen on excavation.

Comprehensive Book on Construction Industry

Widely held theories concerning construction industry's instability are punctured in "Stabilizing Construction: the Record and Potential", a comprehensive research study by two economists, Miles Colean and Robinson Newcomb, and issued by the Committee for Economic Development.

The book—the result of several years of intensive research into all phases of the industry—is documented with basic data, including official statistics completed in July of last year. The industry is examined as a whole, as are its components, the record of its erratic behavior, the causes, interactions and economic effects of its fluctuations, the misconceptions which have arisen from inadequate statistics, and the possibilities and prospects of making the industry more stable. The authors study population trends and relate them to demands for varying construction—residential, industrial, and public.

CED, sponsor of the work, is a nonprofit organization of leading businessmen and educators, engaged in nonpartisan consideration of national economic policies. The book is published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y., and is priced at $6.00.

To Paris for Caterpillar

J. Robert Hawk, currently Manager of the New York City office of Caterpillar Tractor Co., Peoria, Ill., will be the company's Special Representative in Paris, France. He will maintain greater continuity of contact with American military and other governmental organizations in Europe such as the Mutual Security Administration and the North Atlantic Treaty Organization. His activities will be supplemented by those of export district representatives and Peoria personnel, who will continue to maintain the company's worldwide dealer organization as in the past. Mr. Hawk will be succeeded in New York by John B. Wilson, now District Representative for Caterpillar in Mexico.

Emulsion for Cement

An emulsion for self-curing portland-cement mixtures is offered by the American Polymer Corp., Peabody, Mass. Mixtures with Polyco 470 emulsion are said to cure properly in dry air at ordinary room temperatures. According to the manufacturer the emulsion increases tensile strengths and improves bond strength, and abrasion, impact, and corrosion resistance.

The manufacturer recommends the emulsion in mixtures for floor toppings, wall and ceiling cement plasters, masonry mortars, storage tanks, and concrete pipes.

For further information write to the company, or use the Request Card at page 18. Circle No. 589.

Waterproofing Paint

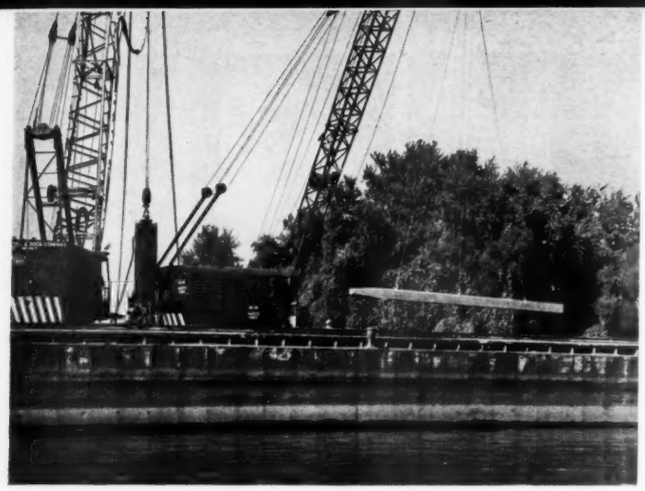
A silicone-cement paint for waterproofing masonry is made by Prima Products, Inc., 10 E 40 St., New York 16, N. Y. The paint is said to give protection against water seepage and dampness. The metallic compounds and silicones in Silitex SF form an insoluble compound that fills the pores of brick, cinder block, stucco, and cement plaster. It comes in white, gray, green, rose, and buff.

For further information write to the company, or use the Request Card at page 18. Circle No. 664.

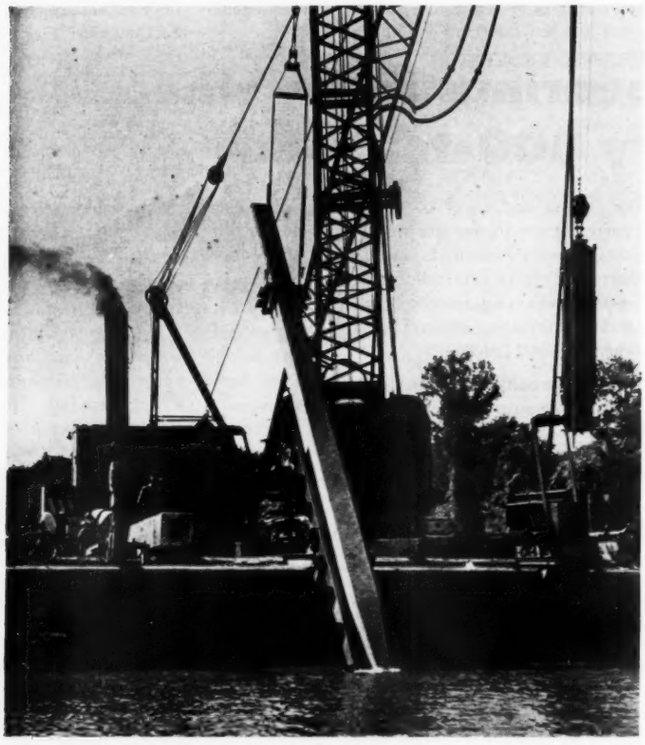
Above 30 inches, as much water escaped from this tower as went in. An application of Silitex SF made it watertight, the manufacturer claims.

Job-Developed Devices Speed Pile Handling

By L. H. HOUCK

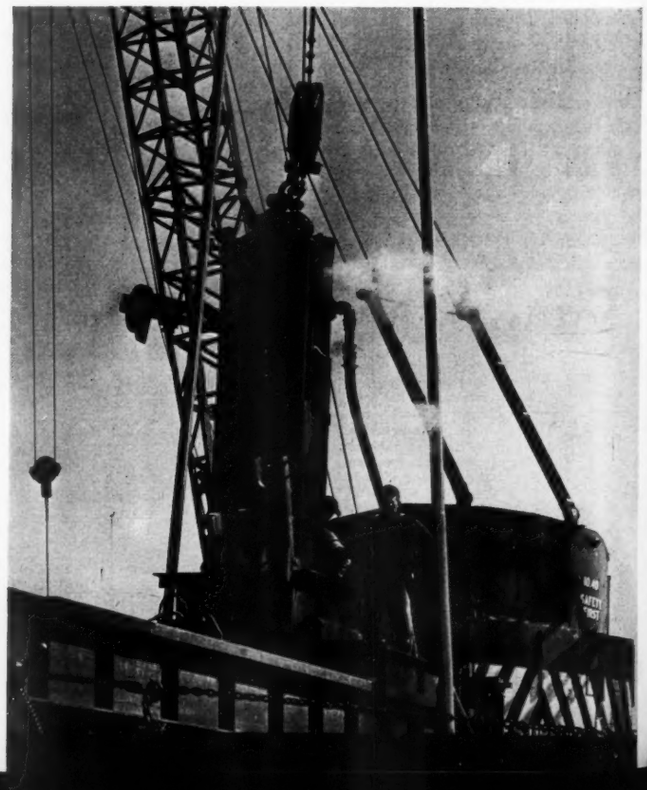


A Manitowoc crane with 80-foot boom lifts a precast reinforced-concrete pile from the supply barge, sets it horizontally in a special cradle hinged to one end of the barge deck.



After the grab was positioned, the crane lifted the pile, the cradle tipped (above), and the 45-foot unit swung into the adjustable template (below).

A big McKiernan-Terry S-8 hammer drives the pile home with a 28-foot steel follower. The jet pipes shown on each side were used to sink the pile through soft top layers.



• A NEW job-developed method of precision pile driving where pile heads end up under 30 feet of water, is an interesting feature of the substructure work on the new high-level steel bridge over the Illinois River at Beardstown, Ill. The new method, which saved a lot of time on the more than 1,300 piles, involved a movable, adjustable, and re-usable template incorporating a positive alignment jig for plumb or batter piles, which pinpointed piles at any place inside the cofferdams in about a tenth of the time usually required.

Bridge Location

With a total length of 3,655 feet, the 540-foot main span will rise 67½ feet above full river stage. The bridge consists of 17 spans, 16 reinforced-concrete piers, and 2 abutments. U. S. 67 and Illinois Route 100 will be carried across above ordinary flood levels by dirt-filled approaches to each abutment. The concrete deck will provide a 26-foot roadway.

The new bridge replaces a 55-year-old toll bridge ½ mile east, which is owned by the City of Beardstown. Besides being in the city traffic area, the old bridge had become inadequate for modern traffic and upkeep costs had become oppressive. Like all other Illinois state-built bridges, the new structure will be toll-free and also located out of city traffic, another policy of the Illinois Division of Highways to keep down unnecessary traffic delays on the State's system of highways.

Need for improving traffic movement in this area with new river crossings had been studied by the Department for some time and the bridge had been in the planning stage for several years pending selection of a suitable site, for which several surveys and soundings had been made.

The approved site was cleared during the winter of 1951-1952 after letting the substructure contract. The next work was 28,000 cubic yards of dirt fill for approaches which came from borrow pits. The fill was actually a reinforcement of an existing levee. Work on this stage of construction was handled by the S. M. H. Co., Peoria, Ill., which used three DW10 Caterpillar scrapers, two D8 Caterpillar dozers,

and a sheepsfoot roller for compaction. This company also made the precast reinforced-concrete piling used by the substructure contractor. The piles were made in the company's yard in Peoria and shipped down to the job by barge.

Contract for the substructure was let to the Great Lakes Dredge & Dock Co., of Chicago, Ill., on December 10, 1951, for $1,858,436.50, and the company came down the river on April 14 with five steel barges loaded with modern equipment. But the river has a will of its own and high water came down too, soon afterwards, and stayed until about May 15. Then the steel strike moved in. The job was scheduled for substructure completion in 285 working days and 100 of them were soon gone with these unavoidable delays.

Pier Areas Pre-Excavated

Before piles were driven or cofferdams constructed, the pier areas were first pre-excavated with a Bucyrus-Monighan 5-N walking dragline mounted on a steel barge and equipped with a 5-yard bucket. To keep most of the job on water, a passage was excavated with this rig from the northern main bank of the river through a small island and strip of backwater to the northern abutment. While some of the material, particularly from the island portion, was spilled on the downstream bank of the passage, some was used to add to the approach fills and also stockpiled for use on the outside of cofferdams.

Cofferdam Routine

Steel-sheet piling for cofferdams was jetted and then driven the final strokes with a McKiernan-Terry 9-B-3 hammer in the leads of a Bucyrus 50-B steam crane mounted on a steel barge. Steam for the hammer was supplied by a separate oil-fired boiler. Water for the jets came from an Ingersoll-Rand 2-stage 6-inch centrifugal pump directly connected to a Series 71 GM diesel.

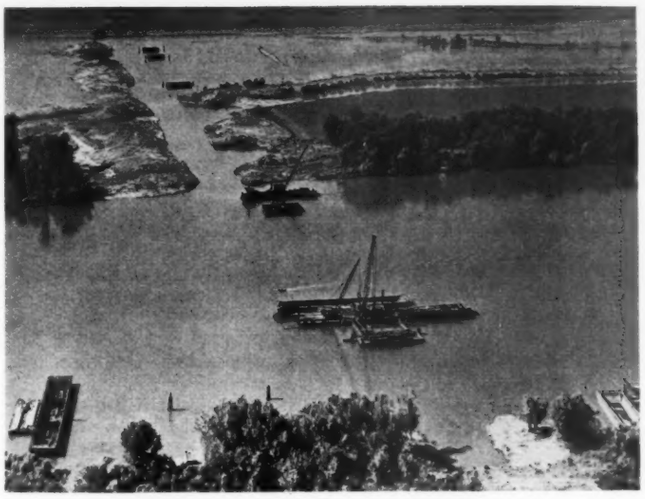
After the steel had been set to complete a cofferdam, the bulk of the sand in the bottom was clammed, but dewatering did not take place until after the piles were driven and the concrete seal placed in the bottom. Due to the river-bottom formation, pumping at this stage would have resulted in an inrush of new sand and silt.

Specially designed steel bracing was used inside the cofferdams and the fact that it was bolted and adjustable made it removable and reusable without requiring much alteration.

A Typical Pier

Pier 12, while the largest, was typical of the layout. The cofferdam for No. 12 was 58 x 41 feet and when finished it contained about 30 feet of water.

A total of 192 precast reinforced-concrete piles, measuring 16 x 16 inches and 18 x 18 inches and weighing 5 and 7 tons, were driven on 36-inch centers. Each pile was 45 feet long. The outside rows were driven on a 12:1 batter. The length of the pile was determined by driving two test piles in each cofferdam. Plan capacity of the piles was 35 and 46 tons.



An air view of the bridge site on the Illinois River near Beardstown, Ill. The cut in the background, excavated by a barge-mounted dragline, kept the job on water.

Adjustable Template

An original adjustable and reusable template system, developed on the job, has proved highly efficient. Plans were sent to Chicago, where the steel was fabricated and the completed outfit sent back to the job by barge. Essentially it consists of two tracks each made of two channels designed to fit over the top of the cofferdam sheeting on each side of the dam. A movable steel bridge fits across the dam and rides on the tracks provided. This bridge has flanged wheels. It moves the length of the cofferdam on the tracks, and can be easily located at any point on the long dimension.

To take care of the crosswise adjustment, there is a large steel cage, or jig, with inside dimensions adjustable to either the 16-inch or the 18-inch piles and their corresponding steel followers. The outside

(Continued on next page)

Job-Developed Devices Speed Pile Handling

(Continued from preceding page)

dimensions of the cage fit inside the members of the bridge and the cage may be easily located at any point in the short dimension by moving it within the bridge framework. With these two adjustments it is possible to pinpoint the spot where each pile is to go with the utmost precision and no waste of time. The length of the cage insures that the pile being held is plumb or at the precise batter ratio, since it cannot deviate because of the large amount of bearing by the cage on its length.

Batter was taken care of by bolting in the proper wedge of wood so that the cage would be mounted at the precise batter inside the horizontal bridge. This method also guaranteed uniformity of the batter angle as well as the plumb of the vertical piles.

Piles were received from Peoria on steel barges and were left loaded until ready for use. Loaded barges were parked out of the main channel for use as needed. When piles were needed, the barge was brought alongside the pile-driving barge by a pusher-type boat powered by a Chrysler outboard Mule, which performed all local barge movements.

Pile Driving

The pile-driving barge was equipped with two cranes. A 2½-yard 54-B Bucyrus-Erie handled the 18,300-pound McKiernan-Terry S-8 single-action hammer. Its 100-foot boom was equipped with three sheaves—the main sheave in the center for the hammer and a sheave on each side for the jet lines which lowered the 90-foot jets on each side of the pile as the hammer's weight on the follower pushed the point of the pile to solid footing.

The piles were handled by the second crane, a 1½-yard Manitowoc with an 80-foot boom. The precast reinforced-concrete piles were provided with three lifting lugs for horizontal handling in the 3-hook sling on the Manitowoc.

After lifting a pile from the supply barge, the Manitowoc deposited it horizontally in a special cradle hinged to one end of the barge deck. In this position the hooks were cast off and a welder burned off the loops while other workmen prepared the pile grab for hoisting the pile to a vertical position. The pile grab was positioned at one-fifth the length (or at 11 feet on the pile illustrated on page 88) to avoid undue strain on the pile.

Transition from the horizontal to the vertical took place when the pile grab was lifted by the crane, which tipped the hinged cradle, the pointed end of the pile going into the water as the top rose. With vertical position established, the crane continued the lift, made the swing, and deposited the pile in the cage of the adjustable template. No piles were damaged in transfer.

As previously explained, batter piles were aligned by two wooden wedges placed on top of the bridge and underneath the cage framework. To drive batter piles the hammer itself was also tilted in its sling to align the hammer with the pile head. The main routine consisted in positioning the cage on the template and delivering a pile vertically to the cage. The 54-B boom then swung over as the Manitowoc boomed away and dropped a jet on each side of the pile, which was slipping down into the sand but was still held in precise position by the cage. The weight of the hammer and the work of the jets started the pile on down beyond reach of the hammer and in the meantime the Manitowoc had picked up a 28-foot 6-inch-long 5-ton steel follower of the same dimensions as the pile, which it placed in the cage on top of the pile.

The 54-B, which had raised the hammer for the follower, now added its weight to the top of the follower and the jets were turned on. Reaching solid footing, the jets were removed and steam was turned in on the hammer which drove the pile the rest of the way. At least 50 blows were necessary for the last foot. Jets were supplied with water from two Ingersoll-Rand 2-stage centrifugal pumps rated at 600 gpm and powered with direct-connected GM diesels.

With this routine and the special equipment the pile-driving rate went up from one or two per day to as high as 16.

Seal Coats

When the piling had been driven, concrete seal coats were poured in cofferdam bottoms. These seals ranged from 4 to 8 feet thick and were composed of Class X concrete to which 10 per cent additional portland cement had been added.

Since each cofferdam contained 30 feet or more of water the seal coat was poured through a 10-inch tremie. Before pouring the seal coat, excess mud and sand was brought up by an airlift. Although the seal coat did contribute materially to the strength of the pier, this strength was not used in the computations, which left it a plus safety factor.

Cofferdams were then dewatered with four pumps used most of the time. For this purpose the contractor had two 4-inch and two 6-inch Jaegers with individual engines.

Concrete Forming

Forms were built on the job and the contractor had a completely equipped carpenter shop and crew for this work. Most of the forms were of standard construction, using ¾-inch oiled plywood for liners on 2 x 6 studs with 2 x 6 wales.

Of particular interest, however, was the forming for the round noses of the piers, which came out with exceptionally smooth surfaces. Forms consisted of Masonite, backed by 2-inch lumber placed on edge and set close together. The Masonite

had been soaked in oil to prevent blistering, and helped give a smooth surface to the concrete.

Concrete Handling

Since this was virtually an all-water job, the concrete handling was also done on water. A steel barge was fitted up for the concrete plant with a MultiFoote 34-E 8-bag mixer, a Blaw-Knox 2-bin 50-ton hopper and scale, and a 1½-yard 38-B Bucyrus-Erie crane.

Aggregate came down the river by barge from the Consumers Company at Lacon, Ill., and the cement was furnished by the Universal Atlas Co., at Hannibal, Mo., who sent it by rail. It was then trucked from the railroad to the barge.

Cement was unloaded from trucks backed onto the barge while it was lying at the dock. The barge was taken to the site of the pour and the aggregate barge was located alongside and in reach of the crane's 80-foot boom.

Pouring was accomplished by crane and concrete bucket with a 2-yard bucket in use filled with 34.7 cubic feet of concrete.

Two Masters and two Mall vibrators were used. Class A concrete was used in the piers and Class X in abutments. Seal coats were Class X with 10 per cent portland cement added.

Abutments

North and south abutments contain identical quantities. Each contains 250 linear feet of 18-inch precast reinforced-concrete piles, 200 feet of 16-inch, and 7,040 pounds of reinforcing steel. Class X concrete in each abutment amounted to 67.1 cubic yards.

Other Contracts

Contract for fabrication of steel superstructure was let to the Allied Structural Steel Co., Chicago, for $1,291,561.25. The Division of Highways divided the job up into the following sections: Section B, substructure; Section D, concrete floor, sidewalks, concrete fill in steel floor; Section E, steel erection; Section F, steel fabrication; and Section P, painting.

Quantities on Contract B were:

Substructure Contract	
Dirt fill	28,000 cu. yds.
Class A concrete	10,979 cu. yds.
Seal Coat concrete	137.1 cu. yds.
Reinforcing steel	567,600 lbs.
Wood piling, 30-foot	8,254 lin. ft.
Precast RC piles	48,000 lin. ft.

G. H. Jaedtke, Construction Superintendent for Great Lakes Dredge & Dock Co., and F. T. Krueger, Resident Engineer for the Illinois Division of Highways.

Personnel

For the Illinois Department of Public Works and Buildings, the Division of Highways was represented by Frank N. Barker, Chief Highway Engineer; Robert H. Tittle, Engineer of Construction; C. M. Wahl, District Engineer; and F. T. Krueger, Resident Engineer.

Great Lakes Dredge & Dock Co., Chicago, was represented by G. H. Jaedtke, Construction Superintendent, who had a crew of 75 on the job.

Small Electric Drill

A new ¼-inch pistol-grip electric drill has been announced by the Independent Pneumatic Tool Co., Aurora, Ill. Among construction features of this addition to the Thor tool line are the handle and field case cast in one piece for added strength, a separate cover for switch mounting, and ample hand grip for comfortable handling of the drill. The switch is of the momentary type, and has a trigger lock pin for continuous operation. Baffle-plate construction and a centrifugal fan make for cool operation.

The drill comes with either geared or keyless chuck. The tool weighs 2¾ pounds and is only 7⅝ inches in length.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 642.

Line of Centrifugal Pumps

Folders issued by the Gorman-Rupp Co., 305 Bowman St., Mansfield, Ohio, describe the company's line of centrifugal pumps. These folders illustrate models with capacity up to 240,000 gpm.

Performance tables are shown for the various pumps, as well as engineering information. Pump-selection tables are included to assist in choosing the proper pump for different jobs.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 665.

"What scares me down here is waims."

A New Dozer Loader

A new combination dozer-loader that is said to mount easily on a crawler tractor is offered by Teale & Co., P. O. Box 308, Omaha, Nebr. The manufacturer states that it fits closely to the front of the tractor for better leverage and lifting power.

The front edge of the bucket can be lowered to a point below the tracks, making it possible to clean up ahead of the tractor. The bucket may be raised to a height of 8½ feet. When dumped at this height the lift control arms strike a protrusion on each side of the bucket. This action causes a "bump" on the bucket which loosens sticky soil and similar material.

Raising and lowering is handled hydraulically from the tractor seat. The bucket can also be gravity-dropped.

For further information write to the company, or use the Request Card at page 18. Circle No. 624.

The Teale dozer-loader raised to its full height of 8½ feet.

Engineer Posts in Iceland

The Corps of Engineers, U. S. Army, is recruiting for certain important engineering positions for duty with the North District, Corps of Engineers, Keflavik, Iceland.

Vacant at the present time are the following posts: General Engineer, GS-15 ($10,800 per annum); Safety Engineer, GS-12 ($7,040 per annum); General Engineers (Estimates), GS-11 ($5,940 per annum); and Civil Engineer (Airfields, GS-11 ($5,940 per annum). In addition to basic salary, employees will receive 10 per cent post differential and free quarters. Employment agreement is one year. No dependents may accompany or join employees, due to lack of family quarters. The Office of the District Engineer states that the cost of living in Iceland is very low.

In addition to the positions listed above, applications are being accepted for all branches of engineering in anticipation of future vacancies. Applications should be sent to the Corps of Engineers, U. S. Army, Office of the District Engineer, North District, Richmond, Va.

Folder on Roof Insulation

A new folder on Fiberglas roof insulation has been published by Owens-Corning Fiberglas Corp., Toledo 1, Ohio. Fiberglas roof insulation is shown in use in industrial plants, schools, stores and shopping centers, hospitals, and public buildings. Data concerning thermal conductance and application specifications are included in the folder. The insulation is said not to rot or decay, shrink or swell, or absorb moisture.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 701.

Adds Midwestern District

A new 9-state sales district has been organized by Mine Safety Appliance Co., Pittsburgh, Pa., manufacturer of safety equipment. C. H. Mehaffey, former Assistant Manager of the Industrial Department at Pittsburgh, is Sales Manager of the new district, with headquarters at Kansas City, Mo. The district includes Kansas, Missouri, Iowa, Nebraska, Minnesota, Wyoming, eastern Montana, North Dakota, and South Dakota.

A New Sod Cutter

A sod cutter that is said to be as easily handled and fast as a power lawn mower is offered by the K & N Machine Works, Inc., 871 Edgerton St., St. Paul 1, Minn. The lightweight Ryan, powered by a 4-hp gasoline engine, is said to cut a uniform swath even over rough terrain. Depth of cut may be adjusted from ½ to 2½ inches.

The spring steel blade which comes in 12 or 18-inch widths, cuts through roots without tearing, and any stones encountered trip a shock release, according to the manufacturer.

For further information write to the company, or use the Request Card at page 18. Circle No. 601.

Detroit Diesel Field News

Detroit Diesel Engine Division of General Motors, Detroit, Mich., has made several additions to its field organization. C. J. Davy, who has been with the Petroleum Sales Department since 1945, has been appointed Sales Representative of a new zone which includes Alabama, Georgia, and Florida. R. J. Hines, formerly associated with a Detroit Diesel distributor, has been assigned in a similar capacity to eastern New York, eastern Pennsylvania, New Jersey, Maryland, and Delaware.

J. R. Sayward, R. T. Hair, C. J. Saurer, and H. S. Pillsbury, former instructors in Detroit Diesel's mobile training schools, have been added to the field service staff.

Data on Belt Fasteners

Literature is available on belt fasteners and rip plates made by the Flexible Steel Lacing Co., 4607 Lexington St., Chicago 44, Ill. The company points out that the bottom plate of the fastener is now assembled at the factory to save time on the job. The Turtle drive-on belt fastener which does not need prepunched holes is also described.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 632.

Tungsten Carbide Tips

Production of 20 standardized solid tungsten carbide tips for circular woodcutting saws has been announced by the Carboloy Dept., of General Electric Co., Detroit 32, Mich.

Eight of the standard tips which have been recommended by industry to the American Society of Mechanical Engineers as the most popular sizes will be stocked items. The others will be sold at stock-item prices when purchased in quantities of 500 or more. The tips will be made in Carboloy Grade 883 for general-purpose applications. They will also be available in Carboloy Grade 44A for heavy duty work.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 633.

Peter W. Eller (right), Board Chairman of the Building Trades Employers' Association, New York, N. Y., helps Fred J. Driscoll, Association President, light up the 50 candles on the golden anniversary cake. The occasion—a birthday dinner at the Waldorf-Astoria.

Power Plant Built On Concrete Piles

Waterproofed With Copper Seals for Lower 28 Feet As Protection from Missouri River Floods

• ONE of the most important features of many new electric-power plants now under construction is the effort to perfect designs that will be virtually shutdown-proof—invulnerable against floods, transportation failures, and other calamities.

The 40,000-kw steam-power plant costing approximately $8,000,000, which is being constructed for N. W. Electric Power Cooperative, Inc., on the north bank of the Missouri River at Missouri City, Mo., has a number of built-in safeguards against operational disturbances. Although designed primarily to burn coal which at the moment seems to afford the greatest economy in terms of power production per pound, it is also equipped for quick changeover to either natural gas or fuel oil. It is insured against shutdown from flood by watertight construction of the first 28 feet, which brings the entrance far above any known flood stage of the Missouri River.

As if that were not enough to keep this steam plant operating under any conditions, it has an elevated underground domestic-water supply also located high above any known flood stages. While this feature may not rank in importance with the other guards against shutdowns, it nevertheless is of high value in any emergency.

Elevated Underground Tank

A newspaper reporter who went to cover the construction of this utility thought they were pulling his leg when they told him about the elevated underground water supply. The tank is buried on top of one of the nearby limestone bluffs and is used mainly for domestic-water supply and secondarily for the small amount of boiler-makeup water needed.

The tank consists of a circular concrete tank located 1,700 feet from the main plant and supplied with water from four deep wells drilled and equipped by the Layne-Western Co. Two of the wells are rated at 300 gpm and two at 250 gpm. The pumps are automatically controlled to keep the water in the 500,000-gallon tank at a constant level. It is 136 feet above the ground level at the plant site, where the elevation is 714 feet against 869 feet for the tank. It is 70 feet in diameter and contains 388 cubic yards of concrete which was supplied in ready-mix trucks by the Oldham Concrete Co., Liberty, Mo.

The reservoir is connected to the main plant with a buried 10-inch cast-iron pipeline. The water supply was designed for fire protection, domestic uses, and boiler-makeup water, and by its location provides gravity flow. Also, being covered with earth, it is freeze-proof in winter.

Site Preparation

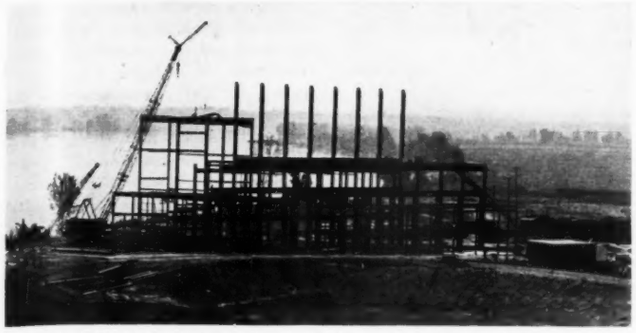
First work at the site after clearing of trees and underbrush was a dirt fill for the substation. This was completed in January, 1951, and in August excavation for the plant proper was started. This was handled by Benton H. Prock of Independence, Mo., who used a D8 Cat-

erpillar tractor with scraper and a ¾-yard 10-B Bucyrus-Erie dragline to excavate to a depth of about 12 feet. The plant is scheduled for completion by July of this year.

Piling Details

Turbine foundations, a railroad bridge, outgoing power-line towers, coal hopper, and other foundation pile driving was subbed to L. G. Barcus & Sons, Kansas City, Kans., who used a McKiernan-Terry 9-B-2 steam hammer on a crane.

An unusual type of hollow-box-girder railroad bridge for the siding track has 30 H-beam steel-bearing piles. These were driven with five under each abutment and ten under each of the two center piers.



The N. W. Electric Power Cooperative, Inc., plant in Missouri City, Mo., as seen from the elevated underground 500,000-gallon water tank. *Houck Photo*

footings were well supported on an elaborate system of piling.

Raymond Concrete Pile Co., New York, N. Y., moved one of their crawler-mounted pile-driving rigs to the job early in 1951 and drove 708 cast-in-place piles, mostly in clusters, under each leg of the important foundations. Piling in all cases was driven to refusal on bedrock. Most of the piles were 44 feet long. The ground level was elevation 714 feet, the bottom of the excavation was 700 feet, and the tops of the piles extended 4 inches into the 5-foot-thick concrete slab poured at 700 feet.

The 161,000-volt outgoing tower required thirty-six 40-foot wooden piles driven to refusal or to 20 tons bearing. This driving was handled with a drop hammer from the 45-foot boom of a ¾-yard Lorain crane.

Sixty-three Class B creosoted wood piles were driven to refusal for the 22 x 32-foot coal-hopper foundation. These ranged from 25 to 35 feet in length. Benton H. Prock had the coal-hopper contract but the

Railroad Siding

The railroad siding, which connects the plant with the Chicago-Kansas City main line of the Wabash, is a mile long and required 210,000 cubic yards of fill. Midwest Pre-Cote Co., Kansas City, Mo., had the railroad-siding contract but subbed the fill to Clarkson Construction Co., Kansas City, Mo., who used five 11-yard Tournapulls and seven 18-yard LeTourneau Carryalls with tractors. Fill dirt was obtained from four borrow pits located about ¼ mile away.

Hollow-Box-Girder Bridge

One of the interesting features of the railroad siding was a unique hollow-box-girder bridge 100 feet long which was designed by the plant engineers, Lutz & May, Kansas City, Mo.

This structure, set on a skew, was a continuous girder of reinforced concrete, 100 feet long, 20 feet wide, and 5 feet 6 inches deep. Inside dimensions of the 100-foot box were

(*Continued on next page*)

Power Plant Built On Concrete Piles

(Continued from preceding page)

6 x 4 feet 6 inches. The roadway on top had a 5-foot overhang. It contained 83,739 pounds of reinforcing steel and 327 cubic yards of concrete. Thought to be the only railroad bridge of this unusual design in this part of the country, it combines strength with economy of construction.

Plant Substructure

The substructure is waterproofed for the first 28 feet with continuous copper water seals set in the reinforced concrete for every break or joint in the walls. Entrance to the plant is from the high ground in front to the operating floor, which is at elevation 729 feet 6 inches. There is a raised entrance so that the plant is protected against flood to an elevation of 733 feet 6 inches. Elevation at the bottom of the excavation is 700 feet; top of piling and concrete slab, 706 feet; and ground elevation, 714 feet. The substructure got an unscheduled test in 1952's spring flood and proved itself to be tight with very little seepage.

Structural steel was set by a 1005 Koehring with a 100-foot boom and a 25-foot jib. *Houck Photo*

Concrete used in the substructure pours was a 6-bag mix designed for 3,000 pounds in 28 days. It was supplied in 5 and 3-yard transit mixers by the Kansas City Quarry Co., Kansas City, Mo. Total concrete for pile caps and substructure was 6,500 cubic yards.

Forming for the substructure was a minor detail since most of the footings were formed with the existing earth which was hard and dry. Some of the 5-foot slabs were formed with earth, but the support obtained from the earth was not considered, in that the entire structure was supported on piling. Other forming consisted of ¾-inch oiled plywood with 2 x 4 studs and 2 x 6 wales. Seven-day tests were made to determine stripping time.

Condenser Cooling

The condenser-cooling lines which take water from the river consist of 1,600 feet of 42-inch welded-steel pipe with an asphaltic coating on the inside and 1½ inches of gunite on the outside. The two lines for each condenser enter the condenser through a divided water box which will allow cleaning of one half while operating on the other half. The lines from the main to the divided halves of the condensers are 30 inches in diameter. They are valved to give reversed flow through the condensers for cleaning. Four 13,000-gpm Economy B-12 pumps will handle the water for the two condensers.

Plant and Personnel

The plant consists of two Westing-

house 20,000-kw hydrogen-cooled turbogenerators supplied with steam from two 220,000-pound-per-hour Foster-Wheeler boilers. This is the first plant to be owned by N. W. Electric Power Cooperative, Inc., which is a farmer-owned cooperative with headquarters in Cameron, Mo. F. A. Martz is General Manager, and Andrew S. Reiff is Power Plant Superintendent.

Engineer-designer was Lutz & May, Kansas City, Mo., who was represented on the job by Glenn Stancliff, Resident Engineer.

Contractors included: substructure, Benton H. Prock, Independence, Mo.; superstructure, Bennett Construction Co., Kansas City, Mo.; grading and fill, Midwest Pre-Cote Co., Kansas City, Mo.; structural steel, Kansas City Structural Steel Co., Kansas City, Kans.; and piling, Raymond Concrete Pile Co., New York, N. Y.

New High-Heat Torch

A new torch that is said to deliver over 2,000 degrees of heat with a 30-inch flame is made by the Cedarberg Mfg. Co., Minneapolis 15, Minn. It will thaw manhole covers and frozen ground, burn weeds, heat

sand, and break rocks, according to the manufacturer.

The Jet Flame Gun has a tank capacity of 2 gallons. Features include external air-pressure pump, pressure gage, and a carrying strap for one-man operation. The gun, which weighs 14 pounds, consumes about 1½ gallons of kerosene or distillate per hour.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 552.

Film on Safe Truck Handling

A new 35-mm sound slidefilm has been produced by the National Safety Council. Of special interest to those engaged in hauling operations in quarries, construction, open-pit ore mines, and coal strip mines, the film includes several spectacular shots of accidents and illustrates safe methods for handling heavy-duty trucks.

"Operating Heavy-Duty Trucks Safely" may be used on automatic or belt-type projection equipment. For information and prices, write to the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Booklet on Drill Bits

A booklet on drill bits is offered by the Calumet Division of Calumet & Hecla, Inc., 3 Calumet Ave., Calumet, Mich. Liddicoat one-use bits chip rather than pulverize, thus providing faster drilling, the manufacturer points out.

Featured are Type L bits for easy-to-drill ground and Type H bits for strong rock and abrasive ground.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 608.

New Power Megaphone

A portable power megaphone said to have a range up to ¼ mile is made by Austin-Lee, Inc., 1624 Eye St., N. W., Washington 6, D. C. The Little Bull is powered by only six standard flashlight No. 2 batteries and operates on a magnetic amplifier without any electronic amplifier or vacuum tubes. No warmup is needed; you press the switch and talk. Dimensions are 8½ x 11 inches. Weight is 5½ pounds.

For further information write to the company, or use the Request Card at page 18. Circle No. 555.

Measures Entrained Air

A booklet on a meter for measuring entrained air in concrete is available from the Concrete Specialties Co., 914 First Ave., Spokane 6, Wash. Using the pressure method, the Press-Ur-Meter is not affected by changes in barometric pressure. The booklet illustrates the steps in making a test.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 582.

Bessmer Is V. P. for Timken

Dwight A. Bessmer has been elected Vice President of Timken Roller Bearing Co., Canton, Ohio. Mr. Bessmer had been Assistant to William E. Umstattd, President.

Speed Curtailed on Turnpike

New traffic signs are appearing on the Pennsylvania Turnpike this year. The high frequency of accidents has prompted action by the Pennsylvania Turnpike Commission and has resulted in the formation of the Joint Highway Research Group. This fact-finding committee, composed of the Pennsylvania Turnpike Commission and Union Switch & Signal, a division of Westinghouse Air Brake Co., is studying conditions on the highway. Aided by the American Institute of Research and the J. E. Greiner Co., Baltimore, Md., it has instituted new speed limits for the whole highway in an attempt to determine the effect of speed on traffic.

On the western half of the Turnpike the maximum speed limit is 60 miles per hour for passenger vehicles and 45 miles per hour for trucks. On the eastern half, the limits are 70 miles per hour for passenger vehicles and buses and 50 miles per hour for trucks. Still lower limits are posted at tunnels, specially zoned areas, and at major bridges.

Galvanized Locknut

A locknut that can be hot-dipped galvanized is announced by The Security Locknut Corp., North Ave. & 15th Ave., Melrose Park, Ill. The galvanized nut will answer problems where alkali, salt water, or other corrosive elements play havoc with nuts and bolts. It is made in sizes from ¾ to 1⅜ inches.

This locknut has a square body, and holds its position on the bolt by means of a locking insert. The insert is a slightly elliptical heat-treated retainer ring of spring steel. When the nut is applied the bolt forces the retainer into the round, causing the retainer to grip the bolt. It will hold its position wherever it is wrenched, the company says.

For further information write to the company, or use the Request Card at page 18. Circle No. 640.

White Model 130-1A industrial engine.

Industrial Engines As Replacement Units

Industrial engines are now available as replacement power units for shovels, cranes, and other industrial and construction equipment from The White Motor Co., Cleveland 1, Ohio. The Model 130-1A shown in the accompanying photo has 340 cubic inches displacement with 4 x 4½-inch bore and stroke and is intermittently rated at 65 hp at 1,400 rpm.

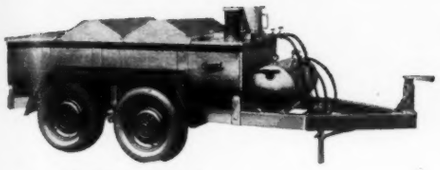
Engines in the White 100 Series are available as replacement power units for shovels up to ¾-yard capacity and cranes up to 20 tons, and also for air compressors, saw mills, cotton gins, feed mills, and other power applications.

For further information write to the company, or use the Request Card at page 18. Circle No. 641.

Literature on Buckets

Literature on clamshell buckets has been issued by the Industrial Brownhoist Corp., Bay City, Mich. Among several buckets described is the type IBH heavy-duty clamshell which is made in ½ through 2-yard sizes. According to the manufacturer this bucket picks up almost 50 per cent more than its rated capacity in easy digging.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 666.



Aeroil's new Heet Master kettles are of the internal-tube-heated type. Two models are available, 375 and 500 gallons capacity.

New Melting Kettles

A new line of large trailer-mounted asphalt-melting kettles is introduced by Aeroil Products Co., S. Hackensack, N. J. The Heet-Master kettles are of the internal-tube-heated type. The two models offered are of 375 and 500-gallon capacity.

Special features of the units include heat risers, a double-tube heating system, low loading height, low point of gravity, load equalizers, short turning radius, lockable rain covers, and adjustable tow eye.

For further information write to the company, or use the Request Card at page 18. Circle No. 610.

Catalog on a Bulldozer

A catalog on a dozer has been released by Independent Distributors, 27 N. E. Broadway, Portland 12, Oreg. It describes the Holt, a hydraulic unit that mounts on any standard crawler tractor. The dozer features the use of Ductilite for parts which receive rough use on heavy jobs. The alloy is said to increase strength while reducing weight.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 560.

Literature on Jaw Crusher

Literature on its line of jaw crushers is available from the Smith Engineering Works, Milwaukee 2, Wis.

The Telsmith crusher is of the force-feed type and is made with feed openings ranging from 10 x 16 inches up to 30 x 42 inches in size. Complete specifications and dimensions are given. Photographs show the crusher in quarry and gravel-plant work.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 604.

Scaffold-Winch Line

A line of scaffold winches is made by the Sasgen Derrick Co., 3101 W. Grand Ave., Chicago 22, Ill. The winches feature an automatic safety brake and a pawl-ratchet locking device. The handle swings against the frame opposite to its working position for added safety.

A model that can be used for tank building, frame setting, riveting, and other jobs has a 1,642-pound capacity and comes with 75 feet of ¼-inch 7 x 19 preformed galvanized-steel aeronautical cable. Drums will accommodate up to 240 feet of cable. Other winches of various capacities are available.

For further information write to the company, or use the Request Card at page 18. Circle No. 635.

Catalog on Couplings

An 8-page bulletin describing hose couplings and fittings is issued by the Hose Accessories Co., 2704 N. 17th St., Philadelphia 32, Pa. It tells how the Le-Hi Quick Lock coupling's U-shaped gasket, expanding under line pressure, provides a seal under all working pressures from 10 to 2,000 pounds in hydraulic service, or 1,500 pounds in non-poisonous non-inflammable gas service. The bulletin describes six types and their uses.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 579.

A section of the John F. Fitzgerald Expressway in downtown Boston.

Elevated Expressway Rises Within Boston

• AS in every large city in this country, the traffic congestion in Boston has been increasing to the point where time lost by the motorist in passing through the city has become very serious. The irregular layout of Boston streets has always presented a problem in routing traffic, because there was no direct way of getting from one part of the city to another. It has been claimed that the streets were constructed on paths established by the meanderings of cows in past years.

About 7 years ago, the State Legislature was authorized to formulate a master plan to provide long-range consecutive construction of express highways and bridges which would tie in all outlying routes. This plan, prepared by consulting engineers, was estimated to cost in its entirety $500,000,000.

At the present time, one section of this scheme, the Mystic River Bridge, built by a special authority at a cost of $27,000,000, is completed and open to traffic. (See C. & E., June, 1949, pg. 2; May, 1950, pg. 17.) Another now under way is being constructed by the Massachusetts Department of Public Works near the business section of Boston at a cost of $40,000,000. The section being built has been named the John F. Fitzgerald Expressway. The whole scheme of the express highways will be an elevated steel structure with ramp connections at critical interchange locations. There will be an individual roadway for the 2-way traffic. Sometimes the elevated roadways are side by side while at other times there is one over the other.

Elevated Highway

The steel elevated highway is carried on column-bent spacing of 60 to 90 feet, varying to suit conditions of cross streets. One span of 375 feet over the Charles River is a double-deck through Warren truss.

For the most part the column footings are founded on concrete or steel piles, varying in length from 20 to 85 feet. In some instances, the borings indicated suitable underlying material which allows for the use of direct-bearing

spread footings. The ramps are constructed of reinforced-concrete retaining walls supported on concrete piles. The interior of the ramps is filled with a suitable gravelly material, followed by a concrete subsurface, then a 2½-inch layer of bituminous concrete for the riding surface.

A Manitowoc crane handles a special internal-core hammer in driving a Raymond Step-Taper pile for a Charles River bridge approach pier. *C. & E. Photo*

The concrete subsurface contains a network of pipes through which a heated ethylene-glycol solution is pumped. This forms a snow-melting system which is installed in the ramps only. The deck of the structure consists of a 7-inch reinforced-concrete slab, covered with a membrane waterproofing, and followed by 2½ inches of bituminous concrete for the riding surface.

Dividing the Work

The Massachusetts Department of Public Works has let out contracts for this construction work in the following three divisions: substructure and surface roads; superstructure; and deck and electrical work.

The substructure contractor also has the task of performing the required building demolition. In the path of the work now under contract were 350 buildings of various sizes, housing as many industries, which had to be demolished. As most of them were old buildings located near the waterfront and market districts, it might be supposed that they harbored a multitude of rodents. Accordingly a program of rodent control and extermination was undertaken to precede the demolition of buildings and to continue through the demolition operation. In this manner, the displacement of any rodents was eliminated at the source. Evidence proved this to have been a well carried-out plan as there has been no complaint of any rodent migration.

Owing to the loss of time consumed in advertising and awarding of contracts, plus the critical steel allocation requirements at this time, the Department ordered and supplied the steel bearing-pile and sheet-pile requirements in advance of awarding contracts. By this act the substructure contractor was able to start his footing and pile work immediately. The superstructure contractor has sufficient time to order and fabricate his own steel.

Three Types of Piles

Three types of piles are used in the support of the column footings—the Raymond pile, the Union Metal pile, and the rolled-steel pile classified as BP 14-inch 89-pound per foot of length. The Raymond pile is composed of a light-gage corrugated-metal shell driven with a mandrel, which is afterwards extracted. The shell remaining in the ground is then filled with a 3,000-pound concrete. The shell is made up of 8-foot lengths screwed together. Starting with a 10-inch tip, each 8-foot length is of uniform section but increases 1 inch in diam-

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Elevated Expressway Rises Within Boston

(Continued from preceding page)

eter for each length. The Union Metal pile is a heavy-gage tapered-shell of a fluted section. This shell is driven directly without a mandrel and is also filled with the 3,000-pound concrete.

Concrete for the pile caps, ramps, and deck is also a 3,000-pound concrete and contains an air-entraining agent. Structural silicon steel will be used for the main supporting girders and floor beams, while all other members will be carbon steel. Utility changes necessitated by the footing construction have caused tremendous underground difficulties, as may be imagined in an old city like Boston.

A few of the important material items for this expressway, somewhat less than 2 miles long, are as follows: 144,500 cubic yards of concrete; 59,000 tons of structural steel; 108,000 feet of steel bearing piles; and 389,000 feet of concrete piles.

This project was designed by consultants in collaboration with the Massachusetts Department of Public Works. All field inspection and engineering is being done by State Department of Public Works engineers. Financing of the project was accomplished by bond issues. The first section was started January, 1951, and is to be completed in 1955. It is expected that extensions will be forthcoming all through this period so that the over-all traffic situation in Boston and vicinity will follow an orderly pattern.

T. Stuart & Son, Watertown, Mass., had the $509,000 contract to construct the two Charles River piers. Other substructure contracts were awarded to Berke Moore Co., Boston; V. Barletta Co., Roslindale, Mass.; and C. J. Maney Co., Somerville, Mass.

General Weed Killer

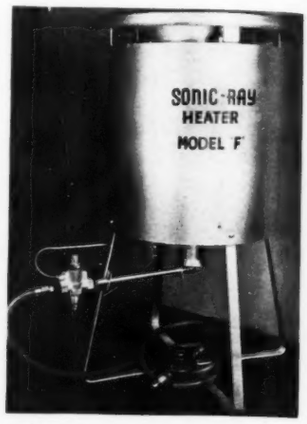
A new non-selective herbicide is available from the Easton Chemicals Division of American Potash & Chemical Corp., 3100 E. 26th St., Los Angeles, Calif. It may be used around roadsides, fences, ditch banks, railroad and public-utility right-of-ways, industrial sites, buildings, storage tanks, and gravel and cinder paths. It may be applied to road and walk surfaces prior to the application of blacktop or concrete, to inhibit the later growth of weeds that may cause cracking.

The herbicide, Tumble-Weed 25, contains 25 per cent sodium chlorate and a minimum of 75 per cent soluble borates plus a wetting and spreading agent. It is said to kill weeds and grasses and leave the soil sterile for a year or longer. It can be applied to both broad-leaf and narrow-leaf types of weeds and grasses.

For further information write to the company, or use the Request Card at page 18. Circle No. 573.

Propane-Gas Heater

A space heater said to operate from 40 to 60 hours on a 100-pound tank of propane gas is made by the Bica Co., Inc., 1170 N. State St., Girard, Ohio. The Sonic-Ray heater is rated at 85,000 to 150,000 Btu per hour.



The unit has construction and road-building applications. Typical uses include keeping the working force warm; heating forms for concrete; defrosting brick and sand; and drying plaster, mortar, and concrete. The heater weighs 31 pounds. Two models are available.

For further information write to the company, or use the Request Card at page 18. Circle No. 603.

Davies for Athey in East

W. L. Davies is the new Eastern District Representative of Athey Products Corp., Chicago, Ill., manufacturer of dozers, loaders, dump wagons, and shovels. His territory includes Washington, D. C., Maryland, and eastern Pennsylvania.

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief extracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Partners in Overlapping Firms—Their Liability

THE PROBLEM: *Where one person is a member of two or more partnerships, does that affect his legal responsibility for acts in each firm?*

THE ANSWER: Not under ordinary circumstances.

Where two or more firms have identical membership, the law differs in different states as to whether there is in legal effect but one partnership. This depends upon whether the laws of a particular state recognize a distinction between the persons who compose a partnership and their firm as being separate legal entities.

Where there is not identical membership in the firms, the affairs of each are usually treated as being legally separate. For example, in a case decided by a Federal district judge in Louisiana two firms, as associated contractors, undertook a housing project in Texas. Later Firm A and a single member of Firm B formed Firm C to undertake a similar job in Louisiana. The judge ruled that a surety company which had written bonds on both projects could not claim proceeds of one project under an indemnity agreement covering the other job. (Maryland Casualty Co. v. Glassell-Taylor Co., 63 Fed. Supp. 718.)

On various angles involved in overlapping partnerships, courts have decided that one firm does not automatically become agent for the other, because both have one or more common members. Ordinarily those who do not belong to both firms are not liable for acts of the other firm or its members as agents of the latter. One not a member of the other firm is not bound to give any sort of notice to that effect.

Where there was identical membership in two or more firms, the assets of both or all have been treated as a common fund for the payment of claims of all creditors.

As noted by a standard legal authority: "Where two or more partnerships, composed of the same members, are separate and distinct businesses, the assets of each firm constitute a separate and distinct fund for effecting the objects of the partnership, out of which the creditors of each firm are payable in preference to the creditors of the other firm, and in preference to the individual creditors of the partners." (68 Corpus Juris Secundum, 668.)

As to the individual liability of one who belongs to two or more firms, there appears to be no legal or logical ground for doubting that, technically, he is a distinct person as to each. In other words, his acts as member or representative of one firm involve responsibility only as to his co-members in that firm, or to outsiders because of the transaction of the business of that particular firm.

Contract Did Not Restrict Source of Agreed Payment

THE PROBLEM: *Earth-moving equipment was rented to a government contractor under an agreement that the rentals would be paid out of estimates advanced by the Government, after reimbursement of a third person for advances made to the contractor to enable him to carry on the work. The lessor of the equipment was not paid out of the estimates. On a theory that the lessor and the contractor did not intend the agreement for payment out of the estimates to provide an exclusive source of payment, was the lessor entitled to enforce payment of the rentals by suit on the contractor's bond?*

THE ANSWER: Yes. (United States v. Mann, 197 Fed. 2d 39, decided by the United States Court of Appeals, Tenth Circuit; reversing a contrary decision by the United States District Court of Oklahoma, Eastern District, 100 Fed. Supp. 920.)

The decision of the higher court rested upon a general rule of law that, where a written agreement is

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ambiguous in a certain respect, the real mutual intention of the parties may be proved by testimony. This contract was not so worded as to show conclusively that it was intended that the lessor of the equipment look solely to the estimates as a source of payment. The court said that if such had been the intention the parties would probably have said that payment was to be made only from the estimates. The surrounding circumstances contradicted any such intention.

Subcontractor Not Liable To Borrowed Truck Drivers

THE PROBLEM: *The prime contractor on housing construction sublet grading, excavation, etc. In turn, the subcontractor sublet part of that work to B. B used his own men and equipment but had to hire two extra trucks with drivers. One of these drivers was injured through negligence of B's employee. Could the injured man maintain a suit for damages against B, or was he, for the time being, an employee of B in such sense that he was limited to collection of workmen's compensation, under the laws of the state of Connecticut?*

THE ANSWER: His suit for damages must be dismissed, and he be left to claim compensation. (Kaufman v. Bowman, 193 Fed. 2d 606, decided by the United States Court of Appeals, Second Circuit.)

The court noted that the owner of the trucks and general employer of the drivers did not undertake to move any excavated material. He was merely paid a set price per hour for use of his trucks and drivers by B.

Rights Between Parties Who Are Jointly Liable

THE PROBLEM: *A Government truck carrying civilian employees was rapidly driven in darkness along a road on a Government reservation. It skidded near an unlighted barricade where a bridge was being constructed. The employees, excepting the driver, were injured, one fatally. The road contractor responsible for insufficiency of warning at the barricade, and the contractor's insurer, settled the claims on account of the accident. On a theory that the truck driver's negligent driving at excessive speed equaled negligence in failing to maintain proper warning lights at the barricade, were the contractor and insurer entitled to require the Government to share half of the damages involved in the settlement?*

THE ANSWER: No. (Brown & Root, Inc., v. United States, 198 Fed. 2d 138, decided by the United States Court of Appeals, Fifth Circuit, affirming a decision of the United States District Court, Southern District of Texas, 92 Fed. Supp. 257.)

The Court of Appeals decided that if there was any difference in fault, that of the contractor was the greater; that the Government had violated no duty it owed to the contractor; and that the contractor and his insurer could not fix liability on the part of the Government for half of the damages by making a settlement with the claimants. The last-mentioned point involved application of a statute in force in Texas.

Gives Doubtful Contract Reasonable Interpretation

THE PROBLEM: *A contract to construct a state expressway involved trunk-sewer construction. If the contract price did not explicitly include cost of cement and excavation, could the bidding specifications and itemized proposal be inferred to show that the contract price was intended to include such cost?*

THE ANSWER: Yes. (Rusciano & Son Corp. v. State of New York, 110 N. Y. Supp. 2d 770, decided by the New York Court of Claims.)

The court recognized: Under a general rule of law applicable to the interpretation of all contracts, if the contract was ambiguous in its meaning, the doubt as to intention must be solved by reading the contract in the light most favorable to the contractor, not the State, because the State's representatives worded the agreement. So, if the contractor was misled in bidding, the State could be held liable. But in interpreting a contract of doubtful meaning it should be given a reasonable interpretation as against an unreasonable one.

On reading the contract in connection with the bidding spex and the bid, it was clear that there was mutual intention that the contract price should include cement and excavation. The court "cracked": "Claimant has not explained to us how it could have expected to build a concrete structure without cement."

Owner's and Contractor's Rights on Unfinished Job

THE PROBLEM: *A contractor agreed to excavate a 3,000-foot ditch for $900. He substantially complied with the specifications, but failed to remove some stumps as agreed, and to cut the ditch to specifications where stumps interfered. Was the contractor debarred from collecting anything for his work?*

THE ANSWER: No, but the owner was entitled to offset the reasonable

Avoid Legal Pitfalls

cost, $150, of making the job conform to the spex. (Poche v. Landry, 57 So. 2d 808, decided by the Louisiana Court of Appeals, New Orleans.)

Surety Awarded Partial Release From Liability

THE PROBLEM: *A construction contract permitted the contractor to draw 80 per cent of the price as the work progressed, the remainder to be drawn on completion. The performance bond authorized progress payments up to 90 per cent. The surety's risk was increased through the owner concealing that advances had been made to the contractor before the bond was given, contrary to the terms of the contract and bond. The contractor defaulted and abandoned the job. (1) Did the provision of the bond permitting 90 per cent progress payments prevail over the 80 per cent provision of the contract? (2) Was the surety released as to advances that violated the contract and bond terms?*

THE ANSWER: Yes. (Metropolitan Casualty Ins. Co. of New York v. Koelling, 57 So. 2d 562, decided by the Mississippi Supreme Court.)

Board Properly Amended Record of Action on Bid

THE PROBLEM: *A county board resolved that a bid of $70,497.32 on a road-treatment job was "the best bid and within the estimate", although there was a bid lower by $277.77. A taxpayer sued to enjoin the award on the higher bid, but the trial court dismissed the suit. Pending the taxpayer's appeal to the Court of Appeals, the board attempted to cure such defect as existed in its original record of acceptance of the bid. To do this it adopted a resolution correcting the original one. The amendatory resolution recited that the accepted bid was "submitted by the lowest competent and responsible bidder and within the estimate made by the county engineer". Was the amendatory resolution valid and effective retroactively as of the date of the original acceptance?*

THE ANSWER: Yes. (State ex rel.

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Avoid Legal Pitfalls

Clymer v. Board of County Commissioners, 107 N. E. 2d 552, decided by the Marion County, Ohio, Court of Appeals.)

After reviewing the facts of the case, the higher court agreed with the trial judge that the higher bid was the best bid, considering the relative competence and responsibility of the respective bidders.

Materials Contract Broken, Special Damages Allowable

THE PROBLEM: *A contractor constructing army housing sublet to defendant a contract to furnish millwork of quality and specifications fixed by the Government. Defendant examined the spex and knew of the time limit for completion of the job imposed on the contractor. The contractor sustained loss through delayed delivery of materials and delivery of defective materials. Was the materialman bound to reimburse him for these damages?*

THE ANSWER: Yes. (Dally v. Isaacson, 245 Pac. 2d 200, decided by the Washington Supreme Court.)

The decision is in line with what courts declare generally: that the breaker of a contract is not liable for special damages arising from circumstances about which he was not informed when the contract was made. Special damages are allowed when, and only when, it is proved that the parties to the contract contemplated that such damages would result from a breach of the contract.

Incidentally, the court decided that, having promptly notified the materialman of defects and delays in delivery, damages were not waived by accepting delivery.

Unbalanced Bid Did Not Invalidate a Job Award

THE PROBLEM: *Bidding spex on a 14,000-foot pipeline job stated: "Bids which are obviously unbalanced may be rejected." An award was made on an unbalanced bid totaling $526,358.50 (the lowest), as against the next lowest bid of $526,590. Was the contractor who made the latter bid entitled to have the job award vacated?*

THE ANSWER: No. (Frank Stamato & Co. v. City of New Brunswick, 90 Atl. 2d 34, decided by the New Jersey Superior Court, Chancery Division.)

The decision rested upon a lack of proof that any fraud, corruption, or abuse of discretion affected the award, or that there was "any substantial irregularity which affected fair and competitive bidding".

The court was influenced by a decision rendered by the New Jersey Supreme Court in 1929, in the case of Phifer v. City of Bayonne, 146 Atl. 463. In that case a contract to lower submarine pipe had been awarded to a company that bid 5 cents per cubic yard for estimated 400,000 yardage—double the actual quantity involved, as was later discovered. The court decided that this award was not invalid as being unbalanced, although the total bid involved nominal prices for some work and enhanced prices for other work. It was found that there was no fraudulent conduct on the part of either engineer or contractor. All bidders had equal opportunity to ascertain all factors entering into the competitive bidding.

State's Liability for Road Contractor's Acts

THE PROBLEM: *Contractors employed by the state of North Carolina to construct a highway were sued by an abutting landowner for damages resulting from diversion of drainage and trespass upon the land. Were the contractors entitled to have the State Highway Commission made a party to the suit, with a view to its being held liable, instead of the contractors?*

THE ANSWER: No. (Moore v. Clark, 70 S. E. 2d 182, decided by the North Carolina Supreme Court.)

The court reasoned: If a contractor does his work properly and according to contract, he is not liable, and the landowner's only right is a claim against the highway department in a condemnation proceeding. If the contractor does his work improperly, the department is not liable. In such a case the landowner's only recourse is a claim against the contractor. So, it was decided that the State Highway Commission was properly dismissed as a party to this suit.

Nonresident Contractor Was Subject to Use Tax

THE PROBLEM: *A nonresident contractor constructed and repaired state highways in Arkansas. Was he exempt from Arkansas use tax on steel, sand, and gravel brought into the state for use on the job?*

THE ANSWER: No. (Morley v. E. E. Barber Construction Co., 248 S. W. 2d 689, decided by the Arkansas Supreme Court.)

The court decided: The use-tax law was not unconstitutional as being discriminatory. The contractor did not come within an exemption of "manufacturers" and "processors" specified by the law, nor did the materials come within an exemption of personal property used in repairing or creating public-transportation facilities.

The Helco aggregate-batching plant.

New Batching Plant

A new portable aggregate-batching plant is announced by the Heltzel Steel Form & Iron Co., Warren, Ohio. The Helco unit is offered with a selection of different batchers for loading truck mixers or batch trucks. It is available in capacities of 30 or 45 tons, with either two or three compartments.

Features of the plant are that it may be transported over highways without special permits and that it erects and dismantles easily on the site.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 612.

Industrial Puller Set

A pulling set for removing and installing gears, bearings, pulleys, wheels, pinions, and shafts on large earth-moving equipment is sold by Owatonna Tool Co., 381 Cedar St., Owatonna, Minn. It is said to reduce down time.

The set includes the new 50-ton Power-Twin hydraulic unit together with suitable pullers and attachments. A 3-speed hand pump or an electrically driven pump is also available.

For further information write to the company, or use the Request Card at page 18. Circle No. 557.

Concrete Accessories

Literature on pick-up inserts, anchor inserts, and braces for tilt-up concrete slabs is issued by Superior Concrete Accessories, Inc., 4110 Wrightwood Ave., Chicago 39, Ill. The pick-up insert with two 1-inch bolts will lift a load of 11,000 pounds when embedded in slabs of 3,000 pounds. Anchor inserts are made for both formed floor slabs and for floor slabs on fills.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 587.

Sturgis Assumes New Post

Maj. Gen. Samuel D. Sturgis, Jr., who was appointed Army Chief of Engineers this winter, has returned from abroad and assumed his new duties. Gen. Sturgis had been serving as Commanding General of the Communications Zone, U. S. Army, in Europe, but at the time of his appointment conditions forced him to stay at his overseas post for an extended period.

Lt. Gen. Pick, former Army Chief of Engineers, who retired November 30, 1952, was recalled to active duty and served until Gen. Sturgis' return.

Booklet on Pocket Transit

A booklet on its pocket transit is available from William Ainsworth & Sons, Inc., 2151 Lawrence St., Denver 2, Colo. The Brunton pocket transit is used for reconnaissance and preliminary surveying, for taking topography, and for geological field work.

Sections are devoted to the use of the instrument in taking horizontal and vertical angles and as a prismatic compass, level, clinometer, plumb, or alidade.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 639.

Deep-Cut Power Saw

A new 8-inch power saw is announced by Cummins-Chicago Corp., 4740 Ravenwood Ave., Chicago 40, Ill.

At 45 degrees the saw's depth of cut is 2⅝ inches, giving blade to spare on cuts in 2-inch rough or oversize lumber. The Maxaw 800 weighs 14 pounds and has a telescoping safety guard.

For further information write to the company, or use the Request Card at page 18. Circle No. 592.

Kuhn for Borg-Warner

J. C. Kuhn has been named Vice President, Sales, of the Atkins Saw Division of Borg-Warner Corp., Chicago, Ill. He was formerly Vice President and Director of Sales for Morse Twist Drill and Machine Co., New Bedford, Mass.

Wyoming Maintenance An All-Year Battle

By W. E. SUTTON, Maintenance and Equipment Engineer, Wyoming State Highway Department

With RAY DAY

• LAST summer, when the Wyoming Highway Department let a contract for rebuilding 4½ miles of U. S. 30 up a steep grade to its highest elevation—8,825 feet—the specifications carried a clause asking the contractor to provide barrels of water for motorists with boiling radiators. That little story sums up in a few words the Wyoming Highway Department's attitude toward its customers—America's travelers.

The same friendly feeling reflects itself in the attitude of maintenance men all over the state. While it isn't exactly in line of duty, one maintenance man in the Gillette-Moorcroft area helped a delighted 75-year-old grandfather back to the highway with a fine antelope buck the old man had just shot.

While these are extreme examples, it is surprising how much real concern for Wyoming's motorists is reflected in the State's maintenance program. In spite of possibly one of the toughest maintenance problems in weather and altitude in the nation, the roads in the Rocky Mountain's frontier state are in excellent shape.

A Long, Uphill Fight

Wyoming's modern maintenance methods were not developed overnight. They are the result of many years of study, application, and experience. Methods considered adequate 5 years ago might well be obsolete today.

Wyoming's first highway maintenance was undertaken back in 1919, when surplus equipment from World War I was being hawked around. It was easy enough to buy a few trucks and graders. In that early day, maintenance men rared back with their thumbs in their vests and pride on their faces as they shaped up the old trails with horse or tractor-drawn drags and graders and bragged to each other about how true a grade they could cut.

But the automobile changed all that, and grades cut true failed to stay that way. People began to demand all-weather roads, and maintenance men started to surface some of the roads with gravel or shale. Patrol systems of maintenance came into being, with a foreman maybe assigned to anything between 10 and 30 miles of road. Maintenance was static. A crew usually had a small horse or truck-drawn grader, possibly a drag, and a few hand tools. When it rained, they "worked" the roads.

Maintenance operations and methods were more or less basic along these lines until about 1930, when it became increasingly evident that traffic-bound gravel or shale surfaces could no longer be maintained under the traffic that had developed. The Department had been experimenting with the bituminous treatment of gravel surfaces as early as 1924, so in 1929 an extensive program was started to surface all primary highways with bituminous-treated gravel. The first snow-removal work was started the same year.

Out of that humble beginning arose Wyoming's modern maintenance program of today. From the very start of the higher-type work, it became evident that old methods and equipment were obsolete. The patrol system of maintenance was retained for a time, but as new motorized equipment was manufactured and acquired, the present-day system of gang maintenance came into being. One of the things being continually emphasized today is that maintenance methods and equipment are still changing, and that the maintenance men must keep abreast of the times.

Old Roads Still Troublesome

Many of those old roads, surfaced with bituminous material over inadequate bases, are still very much with the Wyoming maintenance men today. At the present time Wyoming still has several hundred miles of highways in use that were oil-surfaced 20 years ago. They might have been structurally sound enough to hold the traffic of two decades ago, but the excessive volume and weight of traffic using these roads now is resulting in extensive breakups in the road surface as well as in roadbed distortion. These roads call for continual major repair work to keep them in condition.

Every year it is necessary to rebuild short sections completely in various parts of the state. The usual policy has been to repair or "cure" a number of the sore spots each year in the hope that time and effort would eliminate the majority. The policy is sound, and is still being pursued. Each year many of these bad places are eliminated, but others continually develop. This phase of the maintenance program, however,

is definitely making headway, and many fine sound pieces of highway exist in places which used to be a bog hole. Wyoming's construction program is working as rapidly to bring these old highways to modern standards, which will also help to eliminate excessive maintenance.

In general, the modified gang method of maintenance is still used. Every effort is being made to make temporary repairs to early spring breaks which occur on heavily traveled routes, leaving the permanent repair for a later time when weather conditons are better. The oil-mix mulch is still a tried and proved method. Patching with stone chips has its place and it is used in the early spring and late fall months. Wyoming makes extensive use of machinery in repairing and rehabilitating highway surfaces.

Modern Methods Told

A few years ago, distorted and rough bituminous surfaces were scarified, remixed, and relaid to bring them back in safe riding condition. The method was expensive and slow. It interfered with the traffic flow on heavily traveled roads. Today the sags and holes are first eliminated by spot patching with premixed oiled gravel. A light prime coat of RC-2 in the patch area is first applied, after which the premixed oiled gravel is dumped directly on the road, laid in place with a motor grader, and compacted. This work brings the road surface back to some semblance of its original shape. The entire road surface is then primed with a light coat of MC-1. To complete the job, a light windrow of oil-mixed gravel is hauled on the road and worked from side to side with motor graders until it has been lost in the irregularities of the surface. After a few days' traffic, a seal coat is applied. The final result is a surface as smooth as the original oil mat when it was first laid.

If the sags and holes in the surface to be repaired are not too pronounced, the leveling operation may be dispensed with and, if necessary, the oil-mixed windrow increased sufficiently to take care of the irregularities in the road surface. The above method has been in use in Wyoming for several years and is giving good results. The job can be done quickly. Traffic is not held up unduly. And the finished job is thicker and stronger than the mat originally built.

Highway maintenance in every Wyoming division includes plenty of snow removal. Here a rotary (Snogo) opens a back country mountain pass.

Scarifying and remixing of bituminous surfaces still has its place in the Wyoming program. A soft mat that has a tendency to roll or shove cannot be repaired by adding additional surfacing material. It must be scarified, remixed, and the condition which caused the failure corrected.

Hot-Mix Plants Used, Too

Some of the bituminous-surfaced roads of Wyoming range in elevation as high as 11,000 feet above sea level; all are over 4,000 feet. Temperature and moisture conditions at high elevations are not conducive to good oil work, and in some areas it has been extremely difficult to apply and maintain a bituminous surface properly. To overcome the maintenance difficulty of this condition, the Wyoming Highway Department in 1948 bought two small Barber-Greene hot plants. They proved so worth while that five more have been purchased since. These plants turn out a high-quality mix and are used from early spring well into the winter months. Their use has definitely enabled better quality and greater quantity of maintenance work at higher elevations, and the use of hot-mix plants has now been extended all over the state.

Nearly All State Work

Practically all ordinary maintenance work is done by state forces. The contract method is sometimes used to reconstruct some sections of old highways that are beyond the resources of the Maintenance Division to repair. This reconstruction usually involves flattening of existing fill slopes, improvement of drainage facilities, additional gravel base and new bituminous surface. But these projects can hardly be classed as maintenance, because the rebuilt road bears no resemblance to the original and is adequate to handle the traffic which will use it.

If the projects are large enough to

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Wyoming Maintenance An All-Year Battle

(Continued from preceding page)

interest contractors, Wyoming occasionally does seal-coat work by the contract method. In 1951, for example, about 50 miles of contracting was done to level up existing oil mats which had become rough.

Today's Maintenance Organization

Wyoming today is divided into seven maintenance districts, each containing approximately 650 miles of highway. Each district is in charge of a maintenance engineer who reports directly to the State Maintenance and Equipment Engineer at Cheyenne. Under the district maintenance engineer are crew foremen and section foremen. The crew foreman heads a "gang", usually located in the county seat. The size of this gang is determined by the number of miles of highway assigned for the station, and a rough rule of thumb is one man for every 23 miles of road. These crews are made up of permanent employees who work on a monthly salary basis the year round. During busy periods these crews are augmented by temporary employees paid on an hourly basis. Sufficient equipment to perform any ordinary maintenance requirement is provided at each of these stations.

One of Wyoming's State-owned Barber-Greene hot plants works near U. S. 30.

A few years ago it became apparent that a few sections were being neglected which could not readily be reached by the gang method of maintenance. To overcome this, Wyoming has set up a number of small stations, with a section foreman in charge and one permanent employee. Men at these stations devote most of their time to surface repair.

Every effort is made to do the various maintenance operations uniformly throughout the state. If a better method for doing a job is developed, its use soon spreads statewide.

Modern Equipment Emphasized

Good modern road-building equipment is considered absolutely necessary in Wyoming. All too often an otherwise excellent workman has become dissatisfied and incompetent when he had to do his job with obsolete broken-down equipment. The Highway Department makes a continual check of its equipment, and when the normal operating life has been exhausted or if it has become obsolete, it is promptly replaced. This policy permits the maintenance division to use the latest models in all its equipment, and has resulted in a much better maintenance performance by individual operators.

Radio plays a major role in Wyoming's maintenance work. All cars and pickup trucks used by district maintenance engineers and crew foremen are equipped with Motorola 2-way radio sets. A number of snowplow units have radio installations, and the State will soon be blanketed by complete radio coverage.

During the summer, radio is used for ordering parts and supplies and for general communication between maintenance crews in the field. In winter, radio is absolutely indispensable. Crew foremen use it to direct snowplows to trouble spots, thus enabling a speedup in service to highway users. Snowplow crews use the radio to keep their foremen informed of conditions. Maintenance engineers use radio to keep informed on conditions throughout their districts, and can quickly transfer from

one area to another in emergencies.

There is a growing demand from the public for up-to-date dependable road and weather information during the winter months. Not many years ago, a call for information brought some evasive answer. Today a motorist can call a maintenance station several hundred miles away if he wants to, and receive dependable road and weather information in an instant.

Radio is entirely responsible for the prompt information now being furnished to the public on road and weather conditions. Twice daily, at 8 a. m. and 11.30 a. m., from November 1 to May 1, Wyoming's entire network is given up to gathering road and weather information. Each foreman reports conditions in his area to his control station, which in turn transmits the information to the master control station at Casper. When all reports are in, the information gathered is rebroadcast to all stations and mobile units in the state. The stations and mobile units record the information on a special form for that purpose. The result is complete information on road and weather conditions existing in all areas of the state. This information is given to the local newspapers and broadcasting stations, and is used for answering telephone requests for road and weather conditions.

The entire operation for gathering and rebroadcasting this information takes only 20 minutes of radio time. It is time well spent, since it makes traveling a bit easier and more reliable for those important customers of the Wyoming Highway Department, John Q. Motorist and wife.

Heavy Snow Removal

In company with most Rocky Mountain states, Wyoming has one of the nation's worst snow problems, and no story of maintenance would be complete without an account of this phase of the work.

The first preparations for winter snows begin in October, early in the month. Grass, weeds, and brush are cleared from the right-of-way, and any obstructions which may cause snow to drift on the roadway are removed. Snow fence is repaired and new fence is added where the previous winter's experience indicates that it is needed.

Early in the spring, an Allis-Chalmers motor grader goes to work mixing patch material on a mixing board near the highway.

The plains area of the state often gets 75-mile-an-hour winds, so by streamlining the new road sections, this wind has been put to good use as a self-cleaning snow remover. It takes only a slight raising of the roadway, and some backslope flattening. The flattened cut slopes give additional storage space for rotary-thrown snow.

Maintenance stations are equipped to meet the average winter condition in which the station is located. Under normal conditions, one or two single-way speed plows will handle a section as much as 50 miles long. These plows begin operating as soon as any appreciable amount of snow has fallen, and continue to operate until the storm is over and the road is free from snow. Snowfall and wind conditions during a storm are seldom the same over any area. Experienced men know where the trouble spots are likely to develop, and they concentrate on them. If the storm gets beyond the ability of the equipment in an area, additional machines are called in from areas not affected. It is customary to keep the snow removed as it falls or drifts, and thus bad spots either don't develop or are kept to a minimum. However, at times a storm will be so severe that the light one-way

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Wyoming Maintenance An All-Year Battle

(Continued from preceding page)

plow cannot handle the situation. Large V-plows mounted on 6 to 8-ton all-wheel-drive trucks are then brought into service, followed by rotary plows to throw away the ridges and do the final cleanup work.

In Wyoming's plains areas, all snow is plowed to the windward side of the roadway. After a storm has abated and the wind died down, equipment continues to work until all snow ridges are eliminated. To accomplish this effectively, it is often necessary to pull the ridges back to the highway with motor graders and throw them away with speed plows or small rotaries.

The wind creates the greatest problem of all out in the plains country. Any small obstruction will cause snow to drift, and if plow operators are not alert the small drift starting from a mediocre obstruction will grow and start a blockade. The sky may be clear and the sun shining brightly, but if the wind is blowing, the snowplow crews can be depended on to be out there battling to keep the roads open to traffic.

Wind conditions in the mountains are not severe. Snow piles so deep in the mountains that snow fence often becomes useless and there are now few fences in these localities.

Large all-wheel-drive trucks equipped with V-type plows take the brunt of the work on mountain passes, assisted by rotary plows and the small one-way units. Light snows are handled by one-way plows followed by the large V-plow to wing the material back. As the road narrows from this operation, rotary plows are used to widen and clear the shoulders.

Snow slides are the greatest problem in the mountains. They are especially bad in March and April when the snow begins to melt, but they can also occur in windy periods during the winter. Since a slide always brings down plenty of rocks and trees, they are difficult to remove and hard on equipment. Dozers and rotaries take care of slides.

Ice control is confined to sanding hills and curves on the most heavily traveled routes. Generally, sand treated with calcium chloride is used as an abrasive. Large quantities of coal slack are also available in many sections of the state, and this material also makes an excellent abrasive. During mild weather it will even embed itself in the ice without salt treatment, but calcium chloride is used as a treatment in cold weather.

At the present time, 4,250 miles of highways are maintained through the winter in Wyoming. The equipment roster for snow removal includes 13 rotary plows, 29 large V-type plows mounted on all-wheel drive trucks, and 150 one-way truck plows mounted on 1½ to 3-ton 2-wheel drive trucks. In addition, the Highway Department owns 64 motor graders and 11 dozers that can be pressed into snow-removal service when needed.

During a normal winter Wyoming gets by on about $350,000 for snow removal. One of the worst winters on record, 1949, caused $618,000 to be expended to keep the roads open.

During good weather and bad, Wyoming's formidable and well organized maintenance force stands ready to keep the highways in excellent shape for the motorists who use them. All maintenance operations come under the general supervision of J. R. Bromley, Superintendent of the Wyoming Highway Department, with headquarters in Cheyenne. W. E. Sutton is Maintenance and Equipment Engineer at Cheyenne and is in over-all charge of the big maintenance spread.

Film on Euclid Scraper

A new 16-mm sound-color movie was recently produced by the Euclid Road Machinery Co. The Twin-Power scraper is the subject of the film, which runs for 20 minutes. The Twin-Power is shown selfloading, hauling sand, stockpiling coal and ore, and traveling over soft ground and up steep grades, hauling large loads over poor haul roads.

Contractors and other business organizations may make arrangements for showing the film by contacting their local Euclid distributor. Schools and colleges may borrow the movie by writing the Sales Department, Euclid Road Machinery Co., Cleveland 17, Ohio.

Griffin Wellpoint Changes

Griffin Wellpoint Corp., New York, N. Y., announces the following changes in its regional setup:

Griffin Wellpoint Corp. (Texas) is a newly formed division, located at 6100 Harvey Wilson Drive, Houston, Texas.

Griffin Wellpoint Corp. (Florida) is the new name of the Jacksonville division, formerly known as Griffin Engineering Corp. It is located at 2016 E. Adams St.

The Division at Hammond, Ind., is now Griffin Wellpoint Corp. (Indiana). Formerly called Griffin Equipment Co., Inc., it is located at 548 Indiana St., Hammond, Ind.

An Office on Wheels

To set up a temporary project office on the site of each large construction job would be a gigantic problem and one which any construction firm would wish to avoid. Merritt-Chapman & Scott, New York, N. Y., is no exception, and the company's Project Manager, R. I. Senn, has come up with the right answer. It is a "rolling" office.

Mr. Senn had been thinking about his idea for several years, but it was only when M-C&S moved into Savannah, Ga., to build a $12,500,000 high-level bridge across the Savannah River, that his dream materialized. Two old Pullman cars have become permanent luxurious quarters for the office staff in the field.

The two cars were completely remodeled, using Globe-Wernicke L-shaped Techniplan modular equipment. One car contains Mr. Senn's private office and the central offices; the other holds the Project Engineer's offices and a complete hospital unit. M-C&S finds that it saves at least 30 days by backing this mobile office onto a siding and starting work at once, instead of having to build and equip a temporary office.

Booklet on Weed Killers

A 30-page booklet on weed killers is available from the Chipman Chemical Co., Inc., 44 Factory Lane, Bound Brook, N. J. It discusses the chlorate; 2,4-D; 2,4,5-T; methoxone; arsenical; and dinitro types of weed killers. The booklet explains the nature and correct use of these products and gives individual directions for killing certain common weeds.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 595.

Data on Concrete Cures

Literature on concrete-curing compounds has been released by the Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, Ohio. Permite V-167, V-169, and W-95 cures are discussed. Reports of tests show the degree of moisture retention from one to seven days after application.

This literature may be obtained from the company. Or use Request Card that is bound in at page 18. Circle No. 669.

Wyandotte Officers Elected

Two appointments were recently made by Wyandotte Chemicals Corp., Wyandotte, Mich. George W. Schwarz was promoted to Vice President and Treasurer, and George H. Baker was named Vice President in Charge of the Employee and Public Relations Department.

These two Pullman cars house the "rolling" offices of Merritt-Chapman & Scott Corp., New York, N. Y., which has a contract for the new Savannah River bridge, Savannah, Ga.

Examine Projects, Choose Only Essential, Says AGC

The policies for review of the Federal budget for the fiscal year 1954, with respect to construction, were discussed by the Executive Committee of The Associated General Contractors of America at a meeting last month in Washington, D. C. The AGC's recommendations are as follows:

"We believe that it is sound procedure to examine all public works—and other Federal expenditures, and proceed only with projects which are clearly essential, and to employ on them the strictest standards of economy. This will give further assurance to the public that funds for construction projects are expended economically.

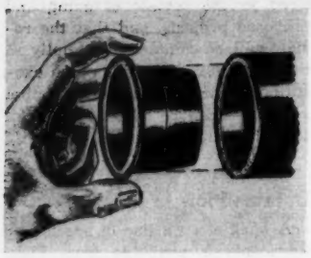
"We have confidence that sound engineering judgment will be exercised in the review of going and proposed projects, and that the review will be completed promptly so that there will be no delays in executing needed projects and so that advantage can be taken of the full 1953 construction season."

Data on How to Lubricate

A booklet on a line of specialized lubricants is available from Fiske Bros. Refining Co., 129 Lockwood St., Newark 5, N. J. It gives the characteristics of specific lubricants in the company's Lubriplate line. The proper application of fluid and grease-type lubricants is discussed.

Detailed specifications are given for the lubrication of construction equipment, cement plants, trucks, and tractors.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 580.



Plastic Pipe Insert

A plastic insert for jointing flexible plastic pipe is announced by Victaulic Co. of America, P. O. Box 509, Elizabeth, N. J. It stiffens and maintains the pipe ends in roundness and permits the use of the standard Victaulic coupling. The company points out that as plastic pipe is pliable, no grooving or other preparations of pipe ends is required to achieve a leak-tight connection.

The insert is tapered for easy insertion in the pipe. Several types of fittings may also be used with the insert.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 647.

Stewart-Warner Names Fiene

Earl R. Fiene recently became Manager of the Detroit, Mich., branch of Alemite & Instrument Division of Stewart-Warner Corp., Chicago, Ill., manufacturer of lubricating equipment, speedometers, and other truck and car accessories. Having served the company 16 years, Mr. Fiene succeeds H. J. Howerth, who has joined the Distribution Sales Division at the general offices in Chicago.

Suction-Hose Booklet

A new catalog on its water-suction hose has been published by The B. F. Goodrich Co., Akron, Ohio. The catalog describes four types of hose which cover all suction-hose service. A table lists types of fittings and their recommended uses.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 551.

Universal Form Clamp Mgr.

J. Von Drasek has been appointed General Manager of Universal Form Clamp Co., Chicago, Ill., manufacturer of concrete-forming equipment, accessories, and building specialties. Mr. Von Drasek, former Vice President, recently completed 25 years' service with the company.

A Cleveland trencher digs a rough plumbing trench for a waste line.

Ten Trenchers Speed A Housing Project

Less time, less money, faster construction. This could be a motto for Levitt & Sons, Inc., Levittown, Pa., the builder who is maintaining a record-breaking schedule for erecting 200 homes per week in the new 16,000-home community of Levittown, Pa. He is adapting assembly-line technique to every possible phase of construction on this multi-million-dollar project. On separate operations Levitt & Sons is employing a fleet of 10 Cleveland trenchers of varying digging-wheel sizes to speed all trench-cutting activities, thereby reducing construction time and costs.

Once the street sites have been laid and rough grading completed, the Clevelands begin digging miles of trench, 16 inches wide and 3 feet deep, for water mains; trenches for water-servicing the individual homes; and some 150 linear feet of footings, 36 inches deep, for each house. Next, the trenchers excavate the rough wide trench for plumbing, and prepare the streets for the lighting conduits. Large diesel-powered Clevelands, used for sanitary lines, hollow out the trench for the vitrified-clay sewer pipe, while smaller machines handle the connecting lines in the sanitary system. The trenchers are important to the mass production of these low-cost homes, which Levitt & Sons hopes to complete early in 1954.

A list of coming conventions appears on page 77 of this issue.

Paper Snow Fences Tried in Michigan

State Highway Department Experiments With Paper Strips As a Substitute for the Wood-Slat Type of Fence

• "PAPER Snow Fence Installations" was the subject of a report presented at a maintenance session of the Highway Research Board's 32nd annual meeting held in Washington, D. C., in January. The report was prepared by Burleigh R. Downey, Maintenance Engineer of the Michigan State Highway Department—Charles M. Ziegler, Commissioner—and covers the Department's experimental work with this type of snow fence. Mr. Downey's paper which follows is a result of a joint investigation between the Maintenance Division and the Testing and Research Division:

During the winter of 1949-1950 the Maintenance Division, in cooperation with the Research Laboratory of the Testing and Research Division, experimented in a small way with snow fences made of paper strips as a substitute for the common wood-slat type. This experimental work was done on M-100, about 4 miles south of Grand Ledge.

The performance of one type of paper snow fence included in this study was so encouraging that in 1951 the Maintenance Division, at the direction of B. R. Downey, Maintenance Engineer, authorized the erection of approximately 5 miles of similar paper snow fence at strategic locations throughout the Lower Peninsula for further study under more natural operating conditions. In all cases the erection of the snow fence was done by local county help.

Paper snow fence was installed in the counties of (1) Alpena; (2) Crawford; (3) Wexford; (4) Saginaw; (5) Eaton; (6) Jackson; and (7) Van Buren.

This report covers the condition of the experimental installations at final inspection, with notes on methods of installation, maintenance, and dismantling as employed by the participating counties. The results of a special test installation located on M-100, 3.2 miles south of M-43, was also reported.

Description of Paper Snow Fence

The paper snow fence consisted of two parallel strips of paper material 12 inches wide, fastened to steel posts spaced 8 feet apart. The space between strips varied from 4 to 12 inches. The bottom strip was placed 6 to 12 inches above the ground, depending upon vegetative growth at the particular location. In some locations three 12-inch paper strips were erected for observation. All of the paper material used in this work conformed to American Society of Testing Materials Designation C 171-49T, Specifications for Waterproof Paper for Curing Concrete.

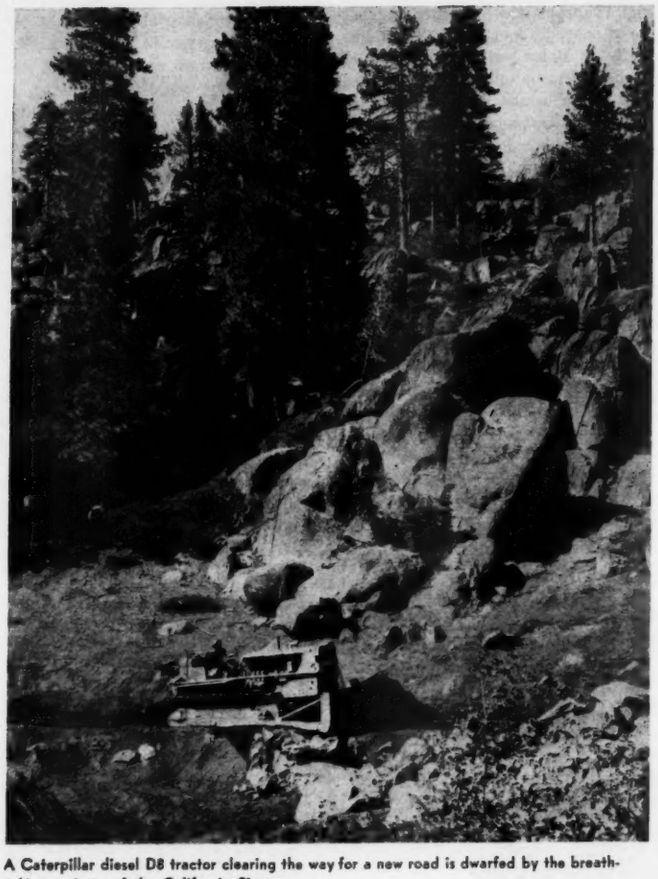
In the erection of the fence, 1 x 2-inch pieces of wood are wired to steel fence posts and the paper strips are fastened in turn to the wooden pieces by means of large staples. A blanket piece, 3 inches wide, of the same material as used in the snow fence, is slipped over the paper strip at each post to protect the paper and also to furnish a better holding condition for the staples.

Performance of Installations

A field survey in April, 1952, revealed without exception that the paper snow-fence installations in all counties came through the winter in fine shape, withstanding bad sleeting, heavy rain, and high winds. Of the 5 miles of fence, approximately 300 feet was found to be damaged. Any damaged panel could have been readily repaired by replacement with new material.

It was determined that the majority of the damage was attributable to loose stock and thoughtless persons, especially school children. It is believed that of future installations this difficulty can be overcome to a large extent by providing a gap in the fence at definite intervals to permit passage through the barrier. Other damage to the fence resulted from improper installation and snow.

(Continued on next page, col. 3)



A Caterpillar diesel D8 tractor clearing the way for a new road is dwarfed by the breath-taking majesty of the California Sierras.

Paper Snow Fences

(Continued from preceding page)

Careful workmanship is mandatory in order to realize satisfactory performance. The performance of the various installations showed definitely that proper attention was paid to erection details in practically all cases.

Special Test Section on M-100

Several different experimental sections of paper snow fence were erected on M-100, 4 miles south of Grand Ledge, this winter, to continue the tests run at this location the previous winter. Included was a section of ordinary picket fence set up in the same area location, so that it was possible to use it for comparison with the paper fence sections. The following sections were erected:

1. Section with two 12-inch strips.
2. Section with three 12-inch strips.
3. Section with one 16-inch strip.
4. Section with two 16-inch strips.
5. Section with one 16-inch strip at bottom and one 12-inch strip at top.

In all cases the opening between the paper strips was about 8 inches.

During the early part of the winter there occurred a series of storms closely following each other, which afforded an excellent opportunity to measure the effectiveness of the various types of fence in stopping moving snow particles.

All of these test sections functioned satisfactorily through the winter, with the exception of one 16-inch-strip section, which was covered in one storm. However, the snow melted away right after this storm, and from then on this section continued to function for the balance of the winter. The only damage that occurred to the various sections was caused by school children playing and breaking one panel out of a section, but this damage was easily repaired by stapling a section of paper between posts. The performance of the paper snow fence may be compared with that of a regular vertical-slat wooden snow fence erected in the same installation.

Installation

From experience it has been found that the fence posts must be spaced evenly at distances not greater than 8 feet. They must also be firmly placed, and end posts must be anchored to prevent movement. Wherever long stretches of fences are required, it is desirable to provide gaps at regular intervals to permit passage of live stock and people through the barrier, thus avoiding possible damage to the fence.

The bottom of the lower strip of paper may be placed as much as 12 inches from the ground and still produce satisfactory results. The space between the strips should also be approximately 12 inches. Further,

it is very important that the paper be stretched taut so no sagging can occur. Soft-wood stakes are better than hard-wood stakes for facing the metal posts, because of the metal staples. Paper cushion strips are necessary to make the fence perform satisfactorily. They must be of the proper length and width and installed properly.

If it should be necessary to provide for snow-fence height greater than 4 feet, this can be accomplished by attaching to the metal posts wood nailing strips made of 2 x 2-inch stakes of the length desired. Additional strips of paper may be fastened to the wood strips as snowdrift conditions warrant.

Maintenance

Breaks in the paper panels may be easily repaired by simply stapling another strip of paper in place. Small tears in the paper may be controlled by taking a knife and cutting around the tear.

Dismantling

If the fence has been properly installed, it will be possible to take it down and salvage a large part of the paper for future use. In this case the cushion material should extend slightly beyond the paper strip, so that it is possible to catch the ends with a large wide-jawed pliers. It is then a simple matter to pull the paper strip off the post and roll it up with the cushion strip and staples intact. It is possible to pull the posts with nailing strips attached, when the strips do not extend to the ground.

Dump-Body Literature

New literature describes a truck body for hauling central-mixed concrete. The Dumpcrete unit is also shown in several other jobs that it will do from bulk-cement hauling to water-wagon duties.

To obtain this literature write to Maxon Construction Co., Manufacturing Division, 131 N. Ludlow St., Dayton 2, Ohio, or use the Request Card at page 18. Circle No. 561.

Smith Corp. Electrode Plant

A. O. Smith Corp., Milwaukee, Wis., has begun construction of a new electrode plant on a 10-acre site in Lancaster, Pa. When the single-story 41,000-square-foot factory starts operation (scheduled for late July) it is hoped to produce millions of pounds of electrodes every month.

Bradford Appoints Jones

Frank W. Jones is the new General Sales Manager of The Bradford Machine Tool Co., Cincinnati, Ohio. The century-old company, lathe manufacturer, now also makes machine and electric tools.

Mr. Jones comes to Bradford after many years of experience with Cincinnati Bickford Tool Co.

Pinch-Type Flexible Valves

A catalog on a line of pinch-type flexible valves is available from the Farris Flexible Valve Corp., Palisades Park, N. J. The Flex-Valve has a reinforced-rubber valve body.

Some advantages over metal valves are: rubber valves wear longer, do not freeze up, absorb vibration, and are corrosion-resistant.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 594.

Steel Bridge Flooring

A 12-page booklet on structural-plate bridge flooring has been issued by United Steel Fabricators, Inc., Wooster, Ohio. It gives a general description of the flooring and illustrates installation step by step.

It also lists the types of plates available for field stock, and tells how to determine field-stock requirements.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 583.

New Adjustable Shore

A shore with the adjusting screw completely encased to protect it from sand, grit, and concrete is offered by the Marvel Equipment Co., Oshkosh, Wis. Another feature is an inner steel tube with no projections to injure the operator. A single straight crossbar serves as adjusting bar and locking pin. The prop also has oversized base, head plates, and swivel action at the top to prevent binding. It is available in three sizes, with a maximum height of 15 feet.

For further information write to the company, or use the Request Card that is bound in at page 18. Circle No. 615.

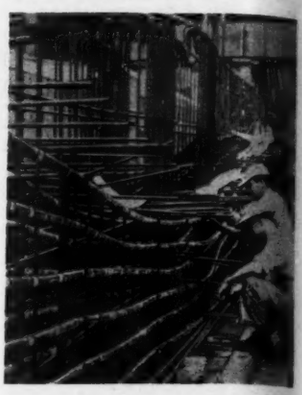
This Marvel shore has a steel tube and an adjustable screw protected from sand and grit.

Crowley a Board Director

Herbert M. Crowley was recently elected a director of the Raymond Concrete Pile Co., 140 Cedar St., New York, N. Y. Mr. Crowley has been associated with the company since 1925.

Plastic Tube Covers Prestressing Cable

Plastic tubing for covering and protecting tensioning cables used in prestressed concrete is made by the Anchor Plastics Co., Inc., 36-36 36th St., Long Island City 6, N. Y. To apply Aeroflex plastic tubing to a greased strand or rod, the workman spreads the end open and places it



on the tensioning member, then runs his thumb along the longitudinal split to open it as he walks along, feeding the tubing into place. Next, masking tape is placed along the longitudinal overlap and fastened around the tubing on 1½-foot centers.

The plastic tubing is said to be unaffected by rain, frost, and ice. It comes in 10-foot lengths to fit diameter sizes ¾ inch and up.

For further information write to the company, or use the Request Card at page 18. Circle No. 609.

Forming System Filmed

A new 8-minute 16-mm film now available from Symons Clamp & Mfg. Co. illustrates the company's forming system. Using both color and sound, the movie explains the basis of the forming system, the hardware required, how best to utilize the forms, details of form erection, pouring of concrete, and stripping the forms.

The film may be obtained by writing to Symons Clamp & Mfg. Co., 4249 Diversey Ave., Chicago 39, Ill.

Manages Cyanamid Explosives

George C. Holton has recently been appointed Manager of the Explosives Department of the American Cyanamid Co., Bound Brook, N. J. He succeeds R. E. Wiley, who will continue to act as consultant.

Catalog on Boiler-Burners

Description of its boiler-burner units appears in a catalog from Kewanee-Ross Corp., a Division of American Radiator & Standard Sanitary Corp., Kewanee, Ill. Tables of dimensions and ratings help the reader to select the proper unit for any particular application to high or low-pressure heating, power, or process steam.

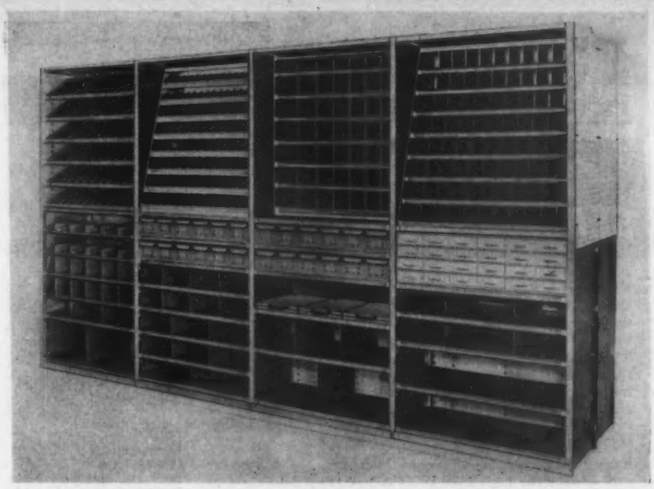
To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 597.

Baker-Raulang Buys Lull

Baker-Raulang Co., Cleveland, Ohio, recently purchased Lull Mfg. Corp., Minneapolis, Minn., producer of heavy-duty industrial lift trucks, front-end-loading tractors, and the Traveloader side-loading lift truck. It will operate the new Baker-Lull Corp. as a wholly-owned subsidiary of Baker-Raulang.

President of Baker-Lull is Gilbert C. Strege, former Manager of McBee Co.'s Technical Division, Milwaukee, Wis.

LeGrand Lull, founder of the Minneapolis company, will be a director of the new subsidiary as well as of the parent company.



New inserts placed in steel shelving make tool-crib arrangements for storage of drills, reamers, taps, milling cutters, or other tools. For further information write to the Lyon Metal Products, Inc., Aurora, Ill., or use the Request Card at page 18. Circle No. 699.

Modern Sewage Plant Part of City Program

Contracts Include Construction of 10-Mgd Primary Plant And Heavy Trenching for Interceptors

• WHILE the first of their new sewage-treatment plants was still under construction, the people of Staten Island, N. Y., already began to enjoy the benefits of New York City's multimillion-dollar pollution-abatement program. Other plants in the Greater New York area have appreciably reduced pollution of the waters which surround the island. The new 10,000,000-gallon-per-day plant at Port Richmond is the first of a series of new plants to be built on the island and will greatly improve its position as a recreational area. Peerless Construction Co., New York, N. Y., received the Department of Public Works contract award May 21, 1951, based on its $1,258,000 low bid. Work started July, 1951, and the new plant was in operation by the end of 1952. This initial phase of the Staten Island project also included a $967,000 contract awarded to Andrew Catapano & Co., Glendale, N. Y., for the construction of Section I of the intercepting sewer mains.

Design of the Plant

The initial plant at Port Richmond provides only primary treatment. It has a 10-mgd capacity serving 70,000 people in the north-central area of the island. When fully developed, the plant will provide a high-rate activated-sludge treatment. It will have a capacity of 30 mgd and serve a population of 200,000 over the entire northern third of the island (about 15 square miles).

Sanitary and storm-water flows will feed to the plant by gravity, entering through a 72-inch interceptor from the west and from the east. The eastern interceptor was not included in the initial phase, however. A 42-inch reinforced-concrete influent line will carry sewage from the interceptor manhole to a 9-foot-wide 28½-foot-long wet well. The floor of the wet well will be at elevation minus 24. Wet-well pumps, two 12½-mgd and one 7½-mgd, will lift the fluid up to elevation 6 for gravity feed through the rest of the plant.

The primary treatment takes place in two settling tanks, 35 x 137 feet in area and 12½ feet deep. The retention period is 2 hours for a 10-mgd flow. The effluent discharges through a channel and a 48-inch reinforced-concrete pipe section to the Kill Van Kull, a tidal stream feeding into New York Bay and the Atlantic Ocean. Sludge-collector equipment collects the sludge from the settling tanks and passes it to a helical-screw drive, thence to a sump, where it is picked up by pumps and delivered to two 56-foot-diameter sludge-digestion tanks. The reinforced-concrete tanks are 29 feet deep.

Digested sludge is delivered to one of three adjacent drying beds—180 x 80, 180 x 160, and 180 x 240 feet in area. The drying beds consist of 1½-foot layers of coarse stone, fine stone, and sand. A network of corrugated-pipe drains lie under each of the beds to take off excess water, which is returned to the plant. The dried sludge is stored at the site to be used by the Department of Parks and other City agencies.

Contractor Andrew Catapano & Co. uses two cranes with clamshells in downtown Port Richmond for excavating a trench for the intercepting sewer main. *C. & E. Photo*

Timber-Pile Foundation

Peerless Construction Co. moved into the job in July, 1951, with 550 consecutive calendar days allowed for completion. First stage of the work was excavation of the settling-tank area. The hole was about 80 x 130 feet in area and 14 feet deep. A Bay City 45 with a ¾-yard Haiss clamshell, and two International TD-24 dozers handled the digging and grading. Because the plant is within a few hundred feet of the Kill Van Kull, water was a constant problem on the job. The contractor used 3 and 4-inch Marlow pumps to keep the bottom dry.

As the plant site area comprises filled-in land, all of the main structures, with the exception of the pumping station, are supported on piles. Original foundation design for the pumping station was also piling, but this was later changed to a concrete mat support. Over 350 piles were required for the settling tanks. There are about 440 under the sludge-digestion tanks and control building. The piles are timber, about 37 feet long with a 12-inch butt and 8-inch tip. A McKiernan-Terry No. 9-B-3 double-acting steam hammer did the driving, working in fixed vertical leads hung from the boom of a Bay City crane. The driving rig rode on a timber-mat float placed at slab grade. All piles were driven to a 20-ton bearing load. Homelite chain saws made the pile cutoffs.

Peerless made load-capacity and settlement tests on two piles during the early stages of construction, using the pile-driving rig itself as the loading force. The test crews centered the rig over the pile and slipped a 100-ton hydraulic jack between the pile-bearing plates and the underbody of the crane. Then they applied the load on the pile by jacking against the crane. Load increments were read from the gage on the jacking pump; settlement of the pile was recorded by level readings taken from a mark on the pile.

The first test data:

Load (tons)	Time (minutes)	Settlement (feet)
0	0	0.000
10	8	0.004
15	17	0.011
20	28	0.012
25	36	0.014
30	43	0.020
35	50	0.023
41.8	55	0.032
Load (tons)	**Time (hours)**	**Settlement (feet)**
41.8	24	0.033
41.8	48	0.038
0	48	0.027

The data for the second test were essentially the same.

Concrete Operations

The settling tanks have a 12-inch reinforced-concrete floor slab and 18-inch reinforced-concrete walls. Forms were made up on the site—

(Continued on next page)

Modern Sewage Plant Part of City Program

(Continued from preceding page)

1 x 8 sheeting backed by 2 x 4 studs, 14 inches on centers and double 1 x 8 wales laid flat. Richmond water-seal Tyscrus spaced and secured the forms.

Road Materials Corp., Greenville, Staten Island, supplied the 3,500-pound transit-mix concrete in 4 and 6-yard trucks from a plant 7½ miles from the job. Chuting the concrete was not convenient here so the Bay City made the placement with a 1-yard bottom-dump bucket. A Master vibrator, used inside the forms, worked the concrete into the corners and around the complex network of reinforcing steel in the tank walls. Copper water stops were used at all construction joints. The concrete was cured with a water spray and covered with wetted cotton mats. During the winter the forms were covered with salt hay and tarps or dry mats. Scheu Hy-Lo salamanders spaced 15 to 20 feet apart 8 feet from the forms supplied sufficient heat during cold spells. Forms were kept in place a minimum of two days.

The 3,500-pound concrete was delivered to the job in 5-yard batches. Batch proportions were 517 pounds of cement, 1,222 pounds of sand, 2,000 pounds of gravel, and 35.7 gallons of water per yard, dry weight, for ¾-inch gravel and a 4-inch slump.

Forming and concrete methods for the sludge-digestion tanks were the same except that the wales were double 2 x 6's. The walls of the digestion tanks are of reinforced concrete design. They are 16 inches thick from the base to a point near the ground surface. Above the ground they are 13 inches thick and faced with an 8-inch brick wall supported on a ledge poured integrally with the wall. The brick wall covering is 2 inches from the concrete core to provide a dead-air insulating space. A net of vertical and horizontal reinforcing rods is placed 2 inches from the inside and outside faces of the concrete wall.

Driving 2 x 10's for second-stage sheeting with a Chicago Pneumatic no. 1 hammer. *C. & E. Photo*

Trenching

Trenches for the influent and outfall lines were dug by clamshell. The outfall pipe rests on a pile-supported reinforced-concrete cradle, the influent or a reinforced-concrete cradle only. Universal Concrete Pipe supplied the 42-inch-diameter pipe for the 400-foot influent line. Pipe sections were 8 feet long and set by slings through an eyebolt in the pipe. Lock Joint Pipe Co. supplied the 48-inch pipe for the outfall. The 16-foot outfall-pipe lengths were handled the same way as the shorter influent-pipe sections.

Boils a Severe Problem

The real problems began when Peerless started construction in the pumping-station and wet-well area. After the 30-foot lengths of L. B. Foster EZ 2 steel sheeting were driven for the cofferdam enclosing the pumping station and wet well, the contractor started excavation with a ¾-cubic-yard clamshell mounted on a truck crane, the suitable excavated material being used for filling and grading of the site. Timber bracing was placed at the top of the sheeting at elevation minus 6.0. Because of these boils, the contractor proposed to the City that the pile foundation required under the contract be eliminated, and that a tremie seal mat 2.5 feet in depth be substituted without change in contract price. This proposal was accepted, and the invert slab redesigned to meet the changed conditions. After approval of the change in design, excavation proceeded in the wet to elevation minus 17.0. An 8-inch pump supplied by Foundation Equipment Co. then dewatered the area enclosed by the cofferdam, while dock builders installed a permanent ring and bracing of 24-inch I-beams at elevation minus 17.0. After this ring was in

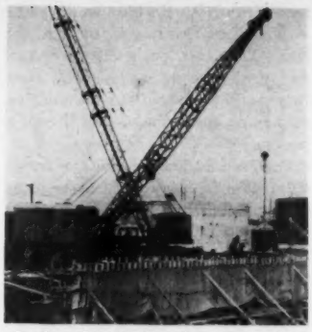
place, all pumping in this area was stopped and the excavation continued down to elevation minus 29, in the wet. This is about 2.5 feet below the subgrade of the invert slab. Meanwhile the water inside the cofferdam had risen to approximately elevation minus 9.0. The sheet piling was driven to approximately elevation minus 34.0 or about 5 feet below the bottom of the tremie seal.

The 2.5-foot tremie seal was placed, the depth of seal being checked with rods, and a period of 2 weeks allowed to elapse, after which the cofferdam was dewatered by means of an 8-inch and 4-inch pump. Boils at various points were still feeding water into the area, but the two pumps kept ahead of the flow. Six-inch vertical relief pipes had been placed in the seal, but proved ineffective. By sealing off all boils, with one exception, which was used as a sump, and diverting ring water, coming up between the sheeting and the seal, to the sump, the two pumps kept the hole dry.

With the seal in place, Peerless poured the invert slab, after laitance was removed from the top of the seal. The exterior walls and pump-room floor slab, with stub walls extending 9 inches above the pump-room floor, were then poured. The exterior wall forms were then stripped and a series of soldier beams set in place between the sheeting and the walls, to allow removal of bracing, so that construction could proceed above this point. After these beams were placed additional concrete, varying from 3 to 4 feet in depth, was poured between the sheeting and the exterior walls to seal off ring flows. Work above this point proceeded without appreciable difficulty.

Work on the Interceptor

Construction of Section 1 of the sewer interceptor was a big job in itself. This line carries both storm water and sanitary sewage flows to the plant. The contract included excavation and placement of 710 feet of 72-inch reinforced-concrete pipe



Peerless Construction Co. uses a Bay City crane with a 1-yard bottom-dump bucket to place concrete for an outside wall of a settling tank. *C. & E. Photo*

west of the plant influent line and 3,775 feet of 54-inch reinforced-concrete pipe further west. The interceptor runs under Richmond Terrace, a well traveled street linking St. George and Port Richmond. Traffic had to be diverted as sections of the line were excavated and the pipe placed. About midway along the line the character of the soil changes from earth to rock—a close-grained gneiss as much as 20 feet above the invert grade.

The contractor expected that the western half of the job would be the most difficult—because of the occurrence of rock—and therefore started to work on this first. When the work on the western section was well along the way to completion Catapano started excavating on the eastern end of the line. Here the excavating crews ran into water boils similar in character to those which plagued the work on the plant.

First stage of the trench excavation was the same in all sections. A couple of portable pneumatic hammers with spade or moil points broke out the pavement. A 315-cfm Chicago Pneumatic compressor supplied the air power for this operation. A Lorain 1½-yard backhoe moved behind the breakers to open a trench about 10 feet wide x 8½ feet deep. At this stage Catapano close-sheeted the cut with 2 x 10-inch mixed hardwood boards, 12 to 16 feet long.

Most of the cut required a second-stage sheeting. The first stage was braced with 8 x 8 cross pieces and foot jacks, and 8 x 8 wales blocked out 3 to 6 inches from the first stage. The second-stage sheeting was then driven between the wales and the first stage as the excavation continued. A ¾-yard Owen clamshell on a Lima crane worked between the braces, 10-foot on centers, to take the cut down to grade. Chicago Pneumatic No. 1 hammers with sheeting heads drove the boards down as the work progressed.

Up at the east end the contractor ran into plenty of water. The trench cut here was all in earth and about 30 feet below the pavement surface. A Moretrench wellpoint system was employed to pull out the water. The points were spaced 2 to 4 feet apart along an 8-inch header. They were jetted to a position 3 feet below the pipe grade. Two 8-inch Moretrench diesel pumps drew the water from the wellpoint system and from three 4-inch automatic "mops" hooked into it. Two 4-inch Marlow pumps were used intermittently in other areas to remove water from the trench.

In rock sections the Catapano crews drove the sheeting to the top of the rock and then stripped it by hand. At first drillers used a Le Roi lightweight wagon drill with a 3-inch drifter. The going was slow so they brought in a Le Roi PL-30 Pipeliner. This rig has two 4-inch drifters and is suspended on a timber gantry riding on track rails up on the street surface. Power came from a 600-cfm Ingersoll-Rand compressor. The drill steel was 1⅛-inch round fitted with Timken carbide bits. The drill pattern alternated 4 and then 2 holes every foot along the length

(*Concluded on next page*)

Modern Sewage Plant Part of City Program

(Continued from preceding page)

of the trench. Work went ahead about 1.5 feet along the cut for each blast, averaging approximately 50 cubic yards per day. Du Pont 40 per cent strength sticks gave the breaking power required. The ¾-yard Lima ate out the broken rock and spilled it into a couple of 8-yard Macks for disposal at the Park Department rock fill on the Kill Van Kull.

The sewer pipe was supplied by American Concrete Pipe Co., Union, N. J., brought to the job on heavy-duty trailer trucks. The 72-inch pipe was cast in 4 and 8-foot sections; the 54-inch all in 8-foot lengths. The 4-foot sections were required up at the eastern end where the sheeting had to be rebraced at shorter distances because of the bad ground and water problem. The Lima crane handled the placement of the pipe on poured-in-place cradles. Joints were poured with cement mortar, covered with commercial cheesecloth, and coated with two layers of a bituminous compound.

Highlights of the Program

Ultimately some ten to twenty million people will benefit by New York City's pollution-abatement program. This is a conservative estimate of the number of people who in summer months leave the city to find relaxation, swimming, fishing, and sunbathing in resort areas. Today they must travel many miles over congested highways to reach a beach or stream free from sewage pollution. Fifty years ago Staten Island and adjacent New Jersey shores were resort areas where the New Yorkers could bathe in clear fresh waters in sight of the city. The New York City program, and similar actions taken by New Jersey and Connecticut communities, may once again make this dream a reality.

The Port Richmond Sewage Treatment Works is one of seven first-stage plants, with a combined capacity of 400 million gallons per day. At a cost of $106,000,000, this has rid all Class A (recreational) waters of pollution. The second stage of the program, scheduled for completion at the end of 1959, provides for the construction of five new plants and the extension of one operating plant. These projects will have a combined operating capacity of 571 mgd. Designs for the largest part of this work are well advanced.

The entire program for the construction of 17 modern plants and the enlargement of three of the existing plants is expected to cost over $300,000,000. The sewer service charge or "sewer rent", based on a percentage of the water bill, provides a sound method of financing the construction and operation of these plants. Most public-works improvement projects, such as this new sewage-treatment plant at Port Richmond, will increase real-estate values on Staten Island. Population growth will also, no doubt, be stimulated.

Personnel

Peerless Construction Co., owned by Charles Tyroler, employed about 40 to 50 men on the construction of the plant. All work was done on a single day shift. The contractor's forces were headed up by S. D. Kapelsohn, Project Manager, and Sam Stiles, General Superintendent. Abe Bolsky was Field Engineer. B. Berman was Project Manager on the Section 1 interceptor contract held by Andrew Catapano & Co. Andrew DeStefana and Philip Ambrosio were Superintendents of the east and west sections respectively.

Edwin G. Layburn, Resident Engineer, of the Bureau of Construction, of which A. R. Glock is Chief, represented the City of New York on both contracts. The design of the plant was under the supervision of S. W. Steffenson, Project Engineer, of the Bureau of Design (Chief, W. A. O'Leary). The pollution-abatement program is under the direction of Richard Gould, Director of the Division of Sewage Disposal. The New York City Department of Public Works is headed by Frederick H. Zurmuhlen, Commissioner, and Albert H. Morgan, Deputy Commissioner.

Engineering and Statistical Draftsmen Needed

The United States Civil Service Commission announces a new examination for Engineering Draftsman and Statistical Draftsman to fill positions in various Federal agencies in Washington, D. C., and vicinity. The salaries range from $2,750 to $5,940 a year.

Appropriate experience or education is required. No written test will be given, but applicants must furnish a sample of their work. To obtain full information and application forms, apply to the U. S. Civil Service Commission, Washington 25, D. C., or to a first or second-class post office. Applications will be accepted until further notice.

Iron Works President Retires

Charles B. Rogers has retired after more than 50 years as an officer of Rogers Iron Works Co., Joplin, Mo., for the last 27 of which he was President. Under his direction, the firm, which was founded in 1901 by his father, purchased the Joplin plant of the United Iron Works Co., the Central Foundry Co., and Joplin Steel & Malleable Co. as part of an expansion program. Rogers Iron Works pioneered many new developments in machinery and rock crushing, such as overhead eccentric jaw crushers.

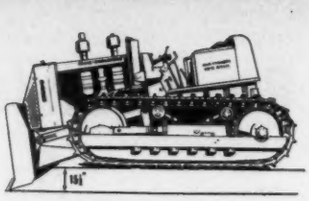
Mr. Rogers has been elected Chairman of the Board of Directors, but he will no longer direct the detail activities of the company.

Subsurface Study With Seismic Method

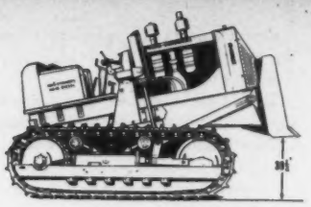
The seismic method of making sub-surface investigations in described in a new booklet available from the Geology & Mineralogy Division, Institute of Industrial Research, Syracuse University, Syracuse 10, N. Y.

The seismic method for determining thicknesses of overburden and depth of bedrock is based on the time for the advance of a wavefront, usually generated by exploding a small charge of dynamite. The arrival of a wavefront is picked up by a detector, which sends an electrical signal to an amplifier. This transmits it to a galvanometer where it is recorded. The record is developed in a few seconds and the results are plotted on a graph.

For further information write to the Institute or use the Request Card at page 18. Circle No. 698.



The Model 15X bulldozer takes a bite 15½ inches below ground. . . .



. . . rises to a maximum height of 39½ inches above ground.

Bulldozer Features Improved Mounting

A new bulldozer for the Allis-Chalmers HD-15 crawler tractor is announced by the Baker Mfg. Co., Springfield, Ill. The conventional pushbeam and much of the weight has been eliminated in the model 15X through a special mounting-lifting mechanism. No wider than a standard highway trailer, it can be transported over the highway without special permits.

The tractor's main spring has been removed, and the entire front tractor frame and dozer is supported by twin hydraulic cylinders. Stabilizer bars connected to the hydraulic pistons and running from track to moldboard absorb torsional strain and reduce horizontal forces on the tractor frame. The dozer blade weighs 5,366 pounds, and is 96 inches wide and 51 inches high. It lifts 39½ inches and bites 15½ inches deep.

For further information write to the company, or use the Request Card at page 18. Circle No. 613.

Martin, Free-Lance Engineer

George E. Martin has recently announced his retirement as Consulting Engineer for the Paving Materials Section, Barrett Division, Allied Chemical & Dye Corp., New York, N. Y. Mr. Martin will be available for highway advisory service; investigations; reports; analyses; lectures; articles; and expert testimony. His address is 59 Locust Ave., New Rochelle, N. Y.

Welding Accessories

A welding-accessories catalog has been issued by the Welding Division of A. O. Smith Corp., 3553 N. 27th St., Milwaukee, Wis. In addition to a description of the company's line, the booklet offers a "package buying" method of ordering.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 674.

Road Builders Hold Annual Meeting

ARBA Discusses Wide Field of Technical Subjects at Boston; Robert M. Reindollar of Maryland Elected President

• EMPHASIZING the technical aspects of the highway industry, more than 700 delegates of the American Road Builders' Association gathered in Boston February 9 to 11 to attend the 51st annual convention of America's oldest good-roads organization. At the final session Robert M. Reindollar, Consulting Engineer, of Baltimore, Md., was installed as President. He succeeds Paul B. Reinhold, President of the Atlas Equipment Co., Pittsburgh, Pa., who held that office for two terms.

The 3-day meeting touched on practically every phase of road and airport building, and evening sessions were required on the first two days of the assembly in order to cover the full program. The George S. Bartlett Award, for outstanding contribution to highway progress, was given to Samuel C. Hadden, Chairman of the Indiana State Highway Commission and a former President of the American Association of State Highway Officials.

Both chambers of the United States Congress were represented at the convention. Senator Edward Martin of Pennsylvania called for the "abolition of Federal gas taxes as soon as may be consistent with national defense", and urged that gasoline-tax receipts be used solely for road-construction purposes. He reminded the road builders that in the past only about two-thirds of the Federal gas tax was distributed to the states for roads, while the remainder was diverted into the general fund. Congressman George H. Fallon of Maryland pointed out that the present needs of the 664,000 miles of the Federal-Aid highway system required an expenditure of over $32 billion, and additional deficiencies are reported daily. He warned that the present rate of highway construction is less than half of that necessary to correct existing deficiencies within a

practical period.

Speaking at the first general session, Brig. Gen. Paul F. Yount, Deputy Chief of Transportation, U. S. Army, stated that the 40,000-mile National System of Interstate Highways has been designated by the Department of Defense as the principal system of highways to serve the national defense. He emphasized the importance of bringing this limited system of arterial highways up to the highest practical uniform standards, including the replacement, on this system, of bridges that are considered below

Robert M. Reindollar, elected President of the ARBA for 1953.

tolerable standards. Gen. Yount stressed that these arterial highways should be built as limited or controlled access for the efficient and effective movement of traffic to serve the national defense.

Special Problems

Wilfred Owen of the Institute for Urban Studies, University of Pennsylvania, discussed highway-transportation problems in urban areas in a paper entitled "The Strange Case of the Strangled City". How the American city came to be congested to the point of strangulation is one of the great mysteries of the 20th century, according to Owen. Likening his subject to a "whodunit" thriller, the speaker explained that there are numerous conflicting views as to how the tragedy occurred, and what needs to be done to revive the victim. But Owen doubted "that we will be able to identify the guilty parties, or state specifically how they are to be apprehended, until we know more clearly what kind of a city we want, and what kind of a city of the future we have, and can afford to have".

C. R. Hanes of the Ohio State Highway Department told the ARBA gathering that there will be a greater shortage of highway engineers in the immediate future than exists now, and that "the supply of graduating engineers will not meet the demand until at least 1965". According to Hanes, engineering graduates last year had from four to fifteen offers for positions before leaving school.

Highway Progress

Progress in the construction of the Inter-American Highway was reported by E. W. James, Chief, Inter-American Regional Office, Bureau of Public Roads. The total length of this highway from the Rio Grande at Laredo, Texas, to the Canal Zone is about 3,200 miles, or almost the same as the distance from New York to San Francisco. Work has now advanced, James disclosed, until today there remain only three impassable gaps amounting to less than 8 per cent of the total distance. These gaps are: (1) 20 miles in Guatemala adjacent to the Mexican border; (2) a section in northern Costa Rica about 100 miles long; and (3) a 120-mile stretch in southern Costa Rica that includes a 15-mile section on the Panama side of the common frontier. When these gaps are closed there will be a passable road from the United States to the Panama Canal Zone.

Except in Mexico, where assistance has been unnecessary, the United States government has furnished both technical and financial aid to the Latin American countries for the I-A highway. About two-thirds of the cost of the individual projects is provided by the U. S., with the cooperating countries paying the remaining one-third, according to James. To date, this country has spent $41,100,000 on the highway, distributed over a 20-year period from 1930 to 1950.

John McCloskey, Executive Assistant, Massachusetts Department of Public Works, presented a paper covering the Massachusetts expressway program. The focal point of the expressway pattern is located in the heart of downtown Boston, McCloskey explained, and takes the form of a circular belt route about 3 miles in diameter. Now under construction, it will be a combination of elevated and ground-level expressways with numerous interchanges to provide access to the business and shopping districts, off-street parking facilities, railroad terminals and main highways.

The state official also outlined a proposed toll road that would cross Massachusetts from the New York state line to the city of Boston, bypassing the large cities. If studies suggest that this highway would be self-supporting, it will be built by the Massachusetts Turnpike Authority.

Technical Papers

Technical papers were presented covering a wide range of subjects in road-building activities, with particular emphasis on the various methods of stabilizing soils and base courses. The newer element in highway construction — prestressed concrete—also was discussed in two papers prepared by Professor Myle J. Holley, Department of Civil Engineering, Massachusetts Institute of Technology, and by Col. W. P. Andrews, Cement and Concrete As-

(Continued on next page)

Road Builders Hold Annual Meeting

(Continued from preceding page)

sociation, London, England. In the absence of Col. Andrews, his report was read by Professor Ben H. Petty of Purdue University.

Col. Andrews wrote that the possibilities for prestressed concrete roads are unlimited, and that it is easy to visualize slabs 3 to 4 inches thick satisfactorily carrying heavy loads. He pointed out that the French engineer Freyssinet claims that a 6¼-inch prestressed slab has a load-bearing capacity equal to that of plain concrete 24 inches thick. The English engineer emphasized, however, the importance of using high-grade concrete in prestressed work, along with careful design and control of the mix, and on correct placing and compaction of the material.

New Officers

The incoming President, Robert M. Reindollar, had been connected with the Maryland State Roads Commission for 40 years, being appointed Chairman of the Commission in 1945. He left that position in 1951, after a change in administration, to become a consulting engineer.

The four regional vice presidents elected at the meeting include: Charles M. Noble, Chief Engineer, New Jersey Turnpike Authority, Trenton, N. J., for the Northeastern District; W. G. Pruett, Highway Director, Alabama State Highway Department, Montgomery, Ala., Southern District; Julien R. Steelman, President, Koehring Company, Milwaukee, Wis., Central District; and Harmer E. Davis, Director, Institute of Transportation and Traffic Engineering, University of California, Berkeley, Calif., Western District.

Jennings Randolph, Assistant to the President, of Capital Airlines, Washington, D. C., was returned as Treasurer. Gen. Eugene Reybold is Executive Vice President.

The Executive Committee will be appointed by the new President.

The following men were elected as directors for the term expiring in 1956: H. L. Aitken, State Engineer, Bureau of Highways, Nebraska Department of Roads and Irrigation, Lincoln, Nebr.; J. L. Cohill, Assistant to the President, Firestone Tire & Rubber Co., Akron, Ohio; Ben T. Collier, State Aid Engineer, Mississippi State Highway Department, Jackson, Miss.; Troy M. Deal, Sr., Square Deal Machinery and Supply Co., Orlando, Fla.; A. T. Goldbeck, Engineer-Director, National Crushed Stone Association, Washington, D. C.; L. W. Lamb, Contractor, Holland, Mich.; Frederick Salditt, Vice President, Harnischfeger Corp., Milwaukee, Wis.

The following were elected as officers for the Contractors Division: S. Howard Brown, Brown, Davis and White, Lebanon, Pa., was elected president for the year 1953. John P. Moss, Moss-Thornton Construction Co., Leeds, Ala., and L. W. Lamb, Holland, Mich., are the new vice presidents.

Waterproof Bootee

A neoprene-coated 10-inch bootee is available from the Lehigh Safety Shoe Co., Allentown, Pa. Tiny suction cups on the sole grip wet floors like a plunger, the manufacturer

states.

The bootee has a steel safety toe box that is said to withstand impacts over a ton.

For further information write to the company, or use the Request Card at page 18. Circle No. 566.

Interchangeable Bases For Soil Compactor

Interchangeable bases for the Jackson vibratory compactor are now offered in any width from 12 inches to 24 inches, the manufacturer announces. Switching bases involves only three parts and takes a few minutes.

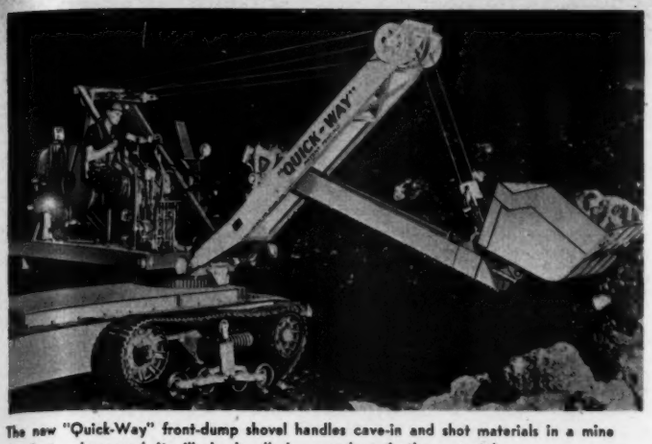
With suitable bases the compactor can be used for a variety of jobs. Typical compacting uses include granular soil in trenches as narrow as 12 inches and subbases for concrete floors. The machine is self-propelling and needs only guidance from the operator. It is said to compact blacktop or granular soil to maximum density at 2,400 square feet per hour.

Write to Jackson Vibrators, Inc., Ludington, Mich., or use the Request Card at page 18. Circle No. 675.

Sattem Is V. P. for Luria

Grant A. Sattem, General Sales Manager of Luria Engineering Co., New York, N. Y., and Bethlehem, Pa., manufacturer of standardized industrial steel building and hangers, has been promoted to the post of Vice President in charge of sales.

Mr. Sattem joined the company in 1948 as Central District Manager of the Chicago branch sales office. Prior to that, he was Manager of Horlick Racine Airport at Racine, Wis.



The new "Quick-Way" front-dump shovel handles cave-in and shot materials in a mine 400 feet underground. It will also handle large rocks and other material.

Front-Dump Shovel

A new front-dump shovel that will handle large rocks and other material is announced by "Quick-Way" Truck Shovel Co., Denver, Colo.

The unit is designed for work where low overhead clearances and maximum dumping heights are required. It is a full revolving shovel powered by a diesel engine and mounted on a diesel-powered M-52 half track. A cab is optional at extra cost. The ⅝-yard shovel attachment is cable-controlled throughout and has an automatic cable crowd with rack and pinion on twin dipper sticks.

For further information write to the company, or use the Request Card at page 18. Circle No. 556.

Motorola Creates Subsidiary

Motorola Communications & Electronics, Inc. is a newly organized and completely owned subsidiary corporation of Motorola, Inc., Chicago, Ill. It will be the duty of the new company to distribute complete mobile 2-way radio systems, multichannel microwave relay systems, power-line carrier, supervisory, and industrial-control equipment — all products of the Communications & Electronics Division of the parent corporation.

A personnel change in Motorola, Inc., concerns John Silver, formerly General Manager of the Communications & Electronics Division. Mr. Silver was recently promoted to be Vice President in Charge of Operations of that division.

Free G-E Decal for Welders

The Welding Department of General Electric Co., Schenectady, N. Y., offers free of charge a decal for welders' helmets. Measuring 1½ x 2½ inches the 2-color oval decal depicts "Joe Magee", a cartoon character executing proper welding technique, even while lying on his back.

The decal may be obtained from G-E welding distributors or by writing directly to the company at Schenectady 5, N. Y.

Resumes Fabrication Of Reinforcing Bars

The fabrication of concrete-reinforcing bars has been resumed in the Fabricating Division of Atlantic Steel Co., Atlanta, Ga. B. W. Bird, who for the past 10 years has been Manufactured Products Sales Department, has now been appointed head of the Fabricating Division.

Bar-bending, hot-dip galvanizing, heat-treating, and special-order forging and stamping are among the services available from the Fabricating Division.

Amsco Promotes Executives

Gilfry Ward has been appointed President of the American Manganese Steel Division of American Brake Shoe Co., New York 17, N. Y., and Joseph Mullin is First Vice President.

Mr. Ward joined the Amsco Division as an engineer trainee in 1928, became Vice President 10 years later, and in 1948 was placed in charge of sales for the division. Mr. Mullin joined the firm in 1914 and by 1945 had become Vice President in Charge of Operations for the Amsco Division.

Plastic Molds for Concrete

Modern plastics have now been put to use as molds for thin-shell precast-concrete panels. The use of such molds in casting thin-shell high-rib roof and floor panels was described by M. R. Montgomery, Trepte Construction Co., San Diego, Calif., and Lt. Comdr. T. G. Atkinson (CEC), USN, Naval Air Station, Miramar, Calif., at the symposium on thin-shell precast concrete held during the American Concrete Institute's 49th annual convention at Boston, Mass., last month.

After experimenting with various types of molds—wood, metal, plaster, and concrete—molds made of glass fabric and plastic were chosen as being durable, light in weight, and easy to repair.

The basic unit of plastic pan was approximately 4 x 4 feet. Two ounces of Fiberglas mat and one layer of Fiberglas cloth per square foot were used in these molds. The center of the form was reinforced for attachment of a special hydraulic release mechanism, used in separating the molds from the concrete panels. Besides light weight and durability, another advantage of the plastic molds was their elasticity, which aided in stripping the forms from the concrete casting.

The symposium included papers on four other projects where thin-shell precast panels were used to advantage.

A detailed description of the plant and job planning for producing large numbers of identical precast-concrete roof elements was given by Charles C. Zollman, Vacuum Concrete Corp., Philadelphia, Pa. Four million square feet of thin-shell rib panels was used for roof framing in 17 warehouses, each 200 x 1,000 feet. Molds made of concrete were used in the casting operations.

So effective was the prior planning and the setting up and operation of the casting yard that the only important interruptions to production were when construction of cast-in-place rigid frames could not keep up to the supply of panels.

C. D. Wailes, Jr., C. D. Wailes Corp., Los Angeles, Calif., described "Factory Production and Handling Problems of Thin-Shell Rib Panels". Precast panels aggregating 300,000 square feet were factory-produced, trucked 117 miles to the job site, and erected to form the walls, floors, and roofs of various types of buildings. Average weight of about 38 pounds per square foot for the 24-foot span panels was a factor in making transportation and production at a commercial plant economical.

Guatemalan Highway

Guatemala has undertaken the construction of an east-west highway from the Atlantic to the Pacific Ocean. At present a railroad affords the only medium of transportation from coast to coast. An American company, the International Railways of Central America, owns the 273-mile line that runs from Puerto Barrios on the Caribbean to San Jose on the Pacific. The highway will offer competition to the railway in transporting native products.

An International TD-24 tractor push-loads a Tournapull. In the background, a hillside cut on the proving ground is sodded to prevent erosion. *International Harvester Photo*

Big Site Is Graded for Proving Ground

One of the world's largest automobile-proving grounds, on which more than 2,250,000 cubic yards of earth was moved in grading for four scientifically designed testing tracks, is being built for the Chrysler Corp. on a 3,200-acre plot at Chelsea, Mich., approximately 55 miles west of Detroit.

This new proving ground consists of a high-speed 4.71-mile oval track, a north and south straightaway of 11,900 feet, and an east and west straightaway of 9,000 feet, both of which have 80-foot turnaround pads at each end, and an endurance track around the perimeter of the area. Design is by W. R. McIlveen and John Gillie, both of Chrysler, with Drury, McNamee & Porter as Consultant.

All earth-moving and grading has been finished, with the paving contract scheduled for completion late in 1953. Holloway & Thompson Co., Detroit, has the prime earth-moving contract on the site, which is spread over an area formerly occupied by 52 farms.

Actual construction of the long-range project slated for constant development over the next 15 to 20 years began on May 15, 1952, when 12 International TD-24 crawler tractors and scrapers, some owned by Holloway & Thompson and others leased from Paul R. Jeffers, Toledo, Ohio, started working on a 60-foot-deep cut at the northwest corner of the oval track.

From this cut, more than 1,000,000 cubic yards of earth was taken for use as fill on both the oval and straightaway tracks. Running with an average load of 15 pay yards, scrapers made the round trip from the cut to the farthest fill areas in about 9 minutes. As dirt was removed from the cut, the 1½ on 1 slope was sodded to prevent erosion. The slope in the fill area is 4 to 1 and is seeded in rye, clover, and fescue.

In the construction of the fill areas, Holloway & Thompson were

(*Concluded on next page*)

Brekelbaum Joins Thew

E. C. Brekelbaum, former Vice President and Executive Engineer of Harnischfeger Corp., has joined The Thew Shovel Co., Lorain, Ohio, as Director of Methods—a newly created post. He will direct operations within the company's engineering and manufacturing departments.

Spring is here! Time to get your equipment in shape!

Big Site is Graded for Proving Ground

(Continued from preceding page)

required to obtain 95 per cent compaction. All tests on the compacted area are run by Reinhart equipment and in accordance with the Michigan State Highway Cone testing method.

Through careful selection of materials, ranging from fine sands to blue clay, the grading contractors were able to conform to contract specifications by using rubber-tired heavy equipment for compaction purposes. This practice enabled Holloway & Thompson to pick up some of the time lost in removing 200,000 cubic yards of unstable muck from cuts ranging in depth from 5 to 20 feet.

Most outstanding design features of the entire proving ground are to be found in the construction of the oval track, built for a maximum speed of 140 miles per hour. With a guided wheel, it will be possible to obtain speeds in excess of 275 miles per hour.

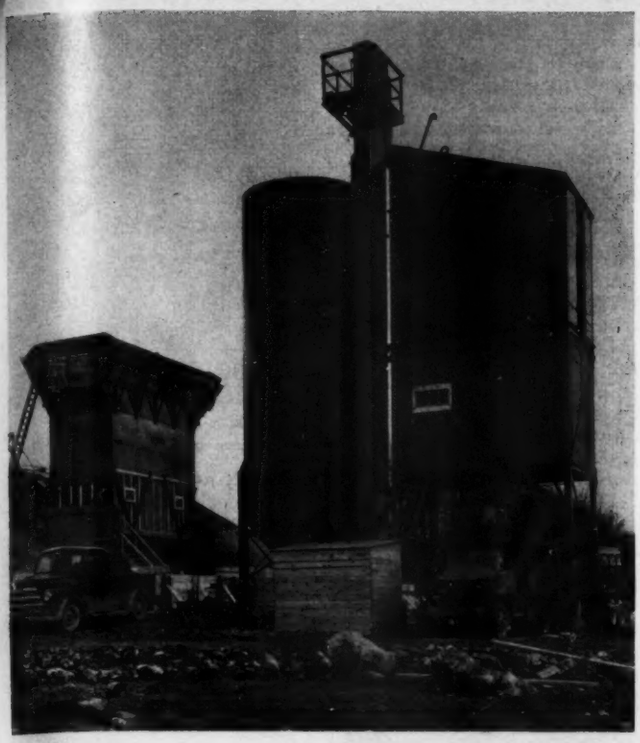
Automotive engineers and technicians had long complained that one of the difficulties with oval-track high-speed endurance tests was that constant speeds could not be maintained when cars entered curves. This complaint is eliminated in the track designed by McIlveen and Gillie. Instead of entering curves on a sweeping circle, drivers will be able to maintain maximum speeds as they enter both north and south curves of the track on a 3,000-foot easement spiral. The easement spiral, 95 feet wide with a 0.0025 left-to-right grade, makes the transition into the curves easier on both men and automobile as it eliminates much of the effects of centrifugal force.

The center line of the pavement around the entire oval will be at the same elevation. In the curves, maximum super elevation from the inside to the outside edge of the pavement will be 13 feet.

This track is composed of alternate sections of macadam, Belgian blocks, gravel, and mud. The purpose of the endurance track is to test a car's ruggedness under conditions encountered anywhere in the United States. Prior to the installation of the endurance track, Chrysler products were road-tested throughout the country. With the new track, engineers believe that cars can be given a more exacting workout than was possible with the old road-testing method.

As part of the endurance track, engineers are installing a water pit and a sand pit each 100 feet long. Surprisingly enough, one of the problems Chrysler officials expect to face when the project is completed is that of keeping the water and sand "torture" pits in what they term "beautifully horrible condition".

"When the heck are you gonna furnish us with a wheelbarrow?"



This electronically controlled pneumatic-batcher mechanism measures out material for bridge-structure concrete placed by the Horvitz Co. on the Ohio Turnpike. For further details on the batcher write to the Heltzel Steel Form & Iron Co., Warren, Ohio. Or use the Request Card at page 18. Circle No. 700.

INVITATION TO BID

Sealed bids will be received in the office of the Engineering and Construction Director, The Panama Canal, Balboa Heights, Canal Zone, until 10:00 A.M. Eastern Standard Time, April 15, 1953, for furnishing all plant, tools, equipment, materials, labor, and services and performing all work for the preparation of sites and construction of utilities, pavements, and buildings for Cardenas Townsite, Cardenas, Canal Zone. Sixty-six masonry type quarters buildings, one telephone exchange and one electrical substation are included in this project.

Copies of plans and specifications may be obtained from the Panama Canal Company, 24 State Street, New York 4, N. Y. Requests should be accompanied by a $40.00 deposit for each set, the deposit to be in the form of a United States money order or certified check payable to "Treasurer, Panama Canal Company." The plans and specifications may be inspected at the following places:

Panama Canal Co.
101 Indiana Ave. N. W.
Washington 25, D. C.

Panama Canal Co.
24 State Street
New York 4, N. Y.

Office of the District Engineer
U. S. Engineer's Office
4735 East Marginal Way
Seattle 4, Washington

Office of the District Engineer
U. S. Engineer's Office
180 New Montgomery Street
San Francisco 19, California

Office of the District Engineer
U. S. Engineer's Office
751 S. Figueroa Street
Los Angeles 55, California

Office of the District Engineer
U. S. Engineer's Office
1709 Jackson Street
Omaha 2, Nebraska

Office of the District Engineer
U. S. Engineer's Office
P. O. Box 1538
Albuquerque, New Mexico

Office of the District Engineer
U. S. Engineer's Office
Foot of Prytania Street
New Orleans, La.

Office of the Division Engineer
U. S. Engineer's Office
Southwestern Division
1114 Commerce Street
Dallas, Texas

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1—Novo traffic line marker.

1—Buckeye Model 402 Ditcher.

⅝ yard Northwest dragline clamp shell combination. A-1.

1—A-C Model HD5G Front End Loader. Completely rebuilt.

1—Caterpillar Model D-4, w/traxcavator, good working condition.

1—Caterpillar Model D-2 End Loader, good working condition.

1—Le Tourneau Model FP Scraper, excellent condition.

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Baltimore 2, Maryland

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B-Monighan 25-yd. & 12-yd. Walking draglines.
Whirley portal gantry cranes, 30-50 tons.
Locomotives, 7 to 80 tons, diesel gas.
Bucyrus 120B 25 cyclo elec. shovel, 4½-yd.
Marion elec. 7½-yd. & 3½-yd. diesel shovels.
Derrick boats, steam, 15 to 30 tons.
Cranes, drglx., shovels, 1½ to 16-yds.
Nordberg-G.E. 875 KW diesel elec. gen. set.
Bucyrus 2-1/3 yd. shovel front eff., 32-SB.
H. Y. Smith Co., 828 N. Broadway, Milwaukee 2, Wis.

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HAYNES PRODUCTS CO., OMAHA 3, NEBR.

SALESMAN WANTED

in Upper Peninsula of Michigan. Experience preferred in earthmoving and construction equipment sales. Send all particulars, qualifications, and photograph.

Brebner Machinery Co., Inc.
Marquette, Michigan

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Back Hoe Attachment for late model 25 Northwest Crane.

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Appley-Yellen High-Speed Block Machine—slightly used. 3,000 Pallets.
185-cu. ft. Ingersoll-Rand Compressor—electric.
118 Steel Racks.
2-ton Yale electric lift truck—new.
2-ton Yale hand hydraulic lift.

CERRETANI CONSTRUCTION CO., Inc., New Canaan, Conn.

For Sale

Welding & Steel fabrication shop near San Bernardino, Calif., on Highway 99. Modern steel shop building 60' x 70'. Equipment includes "A" frame truck, welding machines, electric overhead hoist, etc. Also a very attractive 2-bedroom house. This is a well-established, profitable business offered for a reasonable price. Terms can be arranged. Write or phone: James H. Gebbie, 328 East Highway 99, Loma Linda, Calif. Phone 63151.

Index to Advertisers

(Concluded from page 135)

Manufacturer Memos

Two New Managers for Armco

Armco Drainage & Metal Products, Inc., Middletown, Ohio, has appointed two new division managers. Tom M. Neibling will manage the southwest division, making his headquarters in Houston, Texas; and William O. Robertson, Manager of the eastern division, will have his office in Baltimore, Md.

Both men have had long experience in the drainage and construction fields.

Dupree Promoted by Goodyear

Sam Dupree was recently named assistant to R. S. Wilson, Vice President in Charge of Sales for Goodyear Tire & Rubber Co., Akron, Ohio. Mr. Dupree, who joined the company in 1934, had been Assistant Manager of the Industrial Products Division since 1947. In his new position he will be a liaison executive between Mr. Wilson and the company's Industrial Products, Shoe Products, Chemical, and Steel Products Divisions.

Mohler Rejoins Caterpillar

J. W. Mohler, after 10 months as an official with the National Production Board in Washington, D. C., has resumed his former position of Assistant Director of Sales in the Executive Sales Department of Caterpillar Tractor Co., Peoria, Ill. J. J. Valentine and W. S. Zeigler will continue in their positions of Assistant Directors of Sales with a realignment of duties.

The new General Manager of Caterpillar's York, Pa., plant is L. C. Allenbrand, formerly Manager of the Merchandise Department.

Colorado Fuel & Iron V. P.

H. C. Allington is the new Vice President in Charge of Sales of the Eastern Division of The Colorado Fuel & Iron Corp., New York, N. Y. With headquarters in New York City, he supervises sales of all products of the company and its subsidiaries, including the recently acquired J. A. Roebling's Sons Corp.

L. A. Watts succeeds Mr. Allington as General Manager of Sales of the Wickwire Spencer Steel Division.

J. A. Miller, President of Rosco Mfg. Co., Minneapolis, Minn.

Miller Is Rosco President

J. A. Miller was recently elected President of Rosco Mfg. Co., Minneapolis, Minn., manufacturer of bituminous and water-distributor equipment. Formerly Secretary of the company, Mr. Miller replaces Thorman W. Rosholt, who has retired.

Personnel Changes in Aeroil

Joseph Halperin is the new General Manager and General Sales Manager of Aeroil Products Co., Inc., South Hackensack, N. J., producer of asphalt, tar, and pitch heating kettles. Before joining Aeroil two years ago, Mr. Halperin was manager of National Steam Cleaner Sales Corp., of New York, N. Y., and at one time was associated with Curtiss-Wright Corp.

Irwin Abrams, former Comptroller and Assistant Secretary, was appointed Treasurer of the company. Mr. Abrams has been with Aeroil since 1944. L. L. Yarrington, former Vice President and General Manager of the firm, has resigned to devote time to his own business in Florida.

Otis H. Manchester, Chairman of the Truck Mixer Manufacturers Bureau of the National Ready Mixed Concrete Association.

Concrete Association Elects

Otis H. Manchester, Jr., Secretary-Treasurer of Concrete Transport Mixer Co., St. Louis, Mo., was elected Chairman of the Truck Mixer Manufacturers Bureau of the National Ready Mixed Concrete Association at its annual meeting last December. His term will expire in December, 1953.

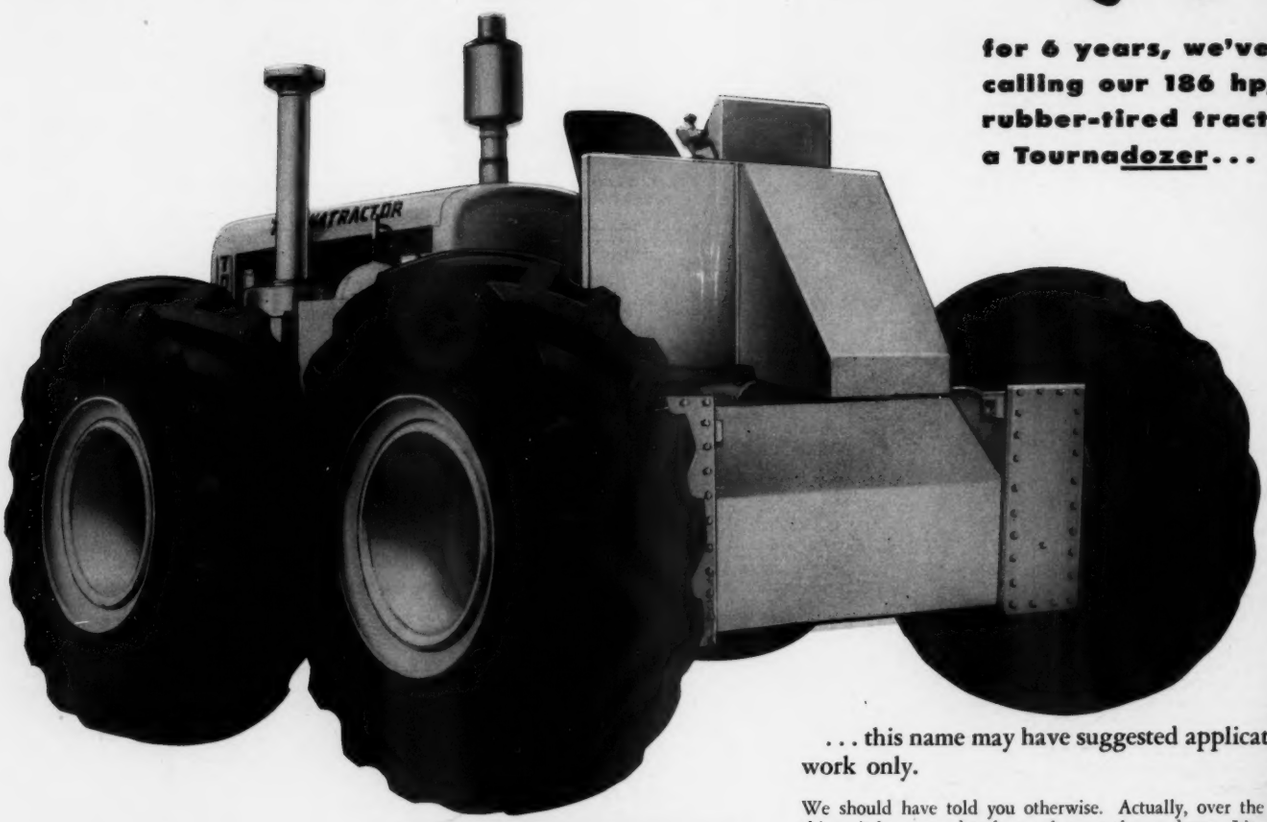
Every March the Red Cross asks help in answering the call of those in need. Let us all respond generously.

INDEX TO ADVERTISERS

(Continued on page 133)

Excuse us for not telling you!

for 6 years, we've been calling our 186 hp, 19 mph rubber-tired tractor a Tournadozer...



. . . this name may have suggested application to dozer work only.

We should have told you otherwise. Actually, over the years, this unit has proved to be much more than a dozer. It's an all-purpose tool — just as effective as a pull-tractor, or a push-tractor, or a haul-tractor as it is a dozing-tractor. Its high speeds and fast maneuvering are of even greater advantage on hauling and pushing than on dozing where output requirements and range of operations are limited.

To clarify its many applications, we are re-naming the unit "Tournatractor". We are also revising our price lists to show our price for the tractor unit without the A-frame, blade, and blade control, so that it will be directly comparable to crawler-tractor prices. On this basis, you will find you can buy a 4-wheel, high-speed, rubber-tired Tournatractor, FOB Longview, Texas, for only $18,840 (with 18.00 x 25 tires). You then can add the matched attachments you want.

This price structure is similar to that charged for any big, heavy-duty crawler-tractor, but look at the money-making advantages you get with Tournatractor:

1. Power . . . 186 hp.
2. Anti-friction power flow, engine to treads.
3. Speeds forward — to 19 mph.
4. Speeds reverse — to 8 mph.
5. Instant speed change . . . constant-mesh transmission.
6. Go-anywhere, 4-wheel-drive on rubber . . . wider range of work and profit opportunity . . . no planking curbs, no trailer haul.
7. Electric fingertip control steer and shift . . . easier, faster maneuvering.
8. Giant safety air brakes . . . 2822 sq. in. on 4 wheels.
9. Low maintenance . . . elimination of some 500 crawler-track assembly parts that grind and wear in dirt on crawling tractors.
10. Easier operation, less fatigue, easier to get good operators.

Investigate this rubber-tired tractor . . . it will do 85% of your tractor jobs *twice* as fast as a crawler. Ask your LeTourneau Distributor to arrange a demonstration and prove it on your job. Make your own comparison of production. You'll find the profits with Tournatractor too big to miss. Write or phone today.

Tournadozer, Angledozer—Trademark Reg. U. S. Pat. Off. Tournatractor—Trademark T-313

R. G. LeTOURNEAU, INC.
Peoria, Illinois

Auxiliary attachments, available any time, make Tournatractor year 'round money-maker

NOTE: Down-pressure attachment, blade tilt mechanism, 14-ton side-boom crane, torque converter, cab, lights also available.

BULLDOZER, ANGLEDOZER For dozing work, Tournatractor can be equipped any time with A-frame and electric-control 2½-yd. Bulldozer, 3-yd. Angledozer, or 11'4" x 54" Root Rake.

PUSHER PLATE, PCU With all-steel pusher plate attached to standard bumper bar, Tournatractor push-loads scrapers. Double-drum electric PCU available for operating towed equipment.

67,000-LB. WINCH For skidding logs, pulling mired trucks, etc. Operates at 56 or 113 ft./min., in or out, while rig is in motion or stationary. Can pull from any angle up to 90°.

SNOW PLOW V-type. Mounts on same A-frame as Bulldozer or Angledozer. Has 12'4" clearing width, 6½' clearing height. 9' electric-control Snow Wing available as optional equipment.

FOR SCRAPER OPERATION Double electric PCU operates any cable-controlled scraper. For LeTourneau electric scraper, optional electric jack can replace PCU. Just "plug in" and go to work.

FOR 24 YEARS THE LEADER IN RUBBER-TIRED DIRTMOVING